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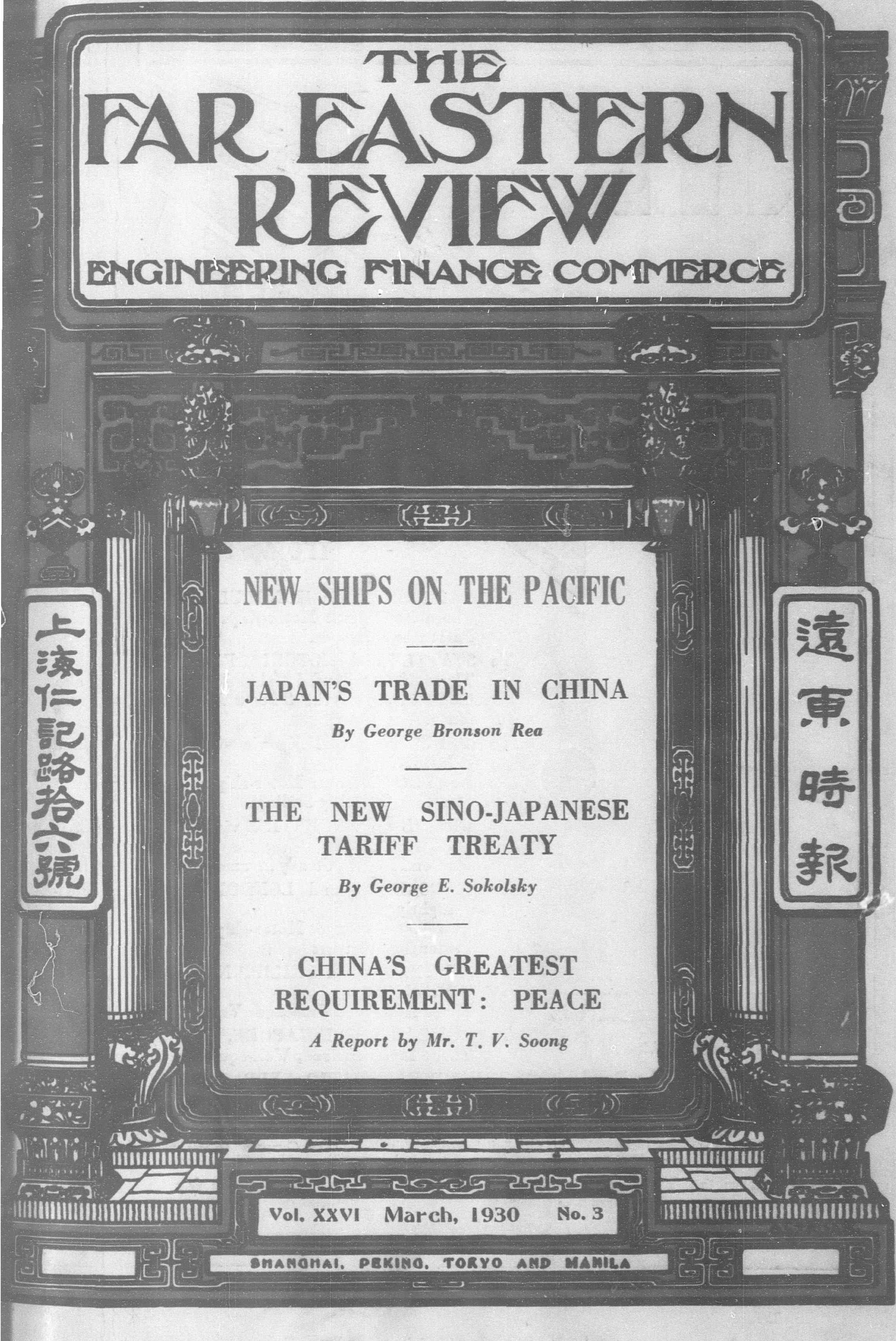

THE FAR EASTERN REVIEW

ENGINEERING FINANCE COMMERCE

遠東時報

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NEW SHIPS ON THE PACIFIC

JAPAN'S TRADE IN CHINA

By George Bronson Rea

THE NEW SINO-JAPANESE TARIFF TREATY

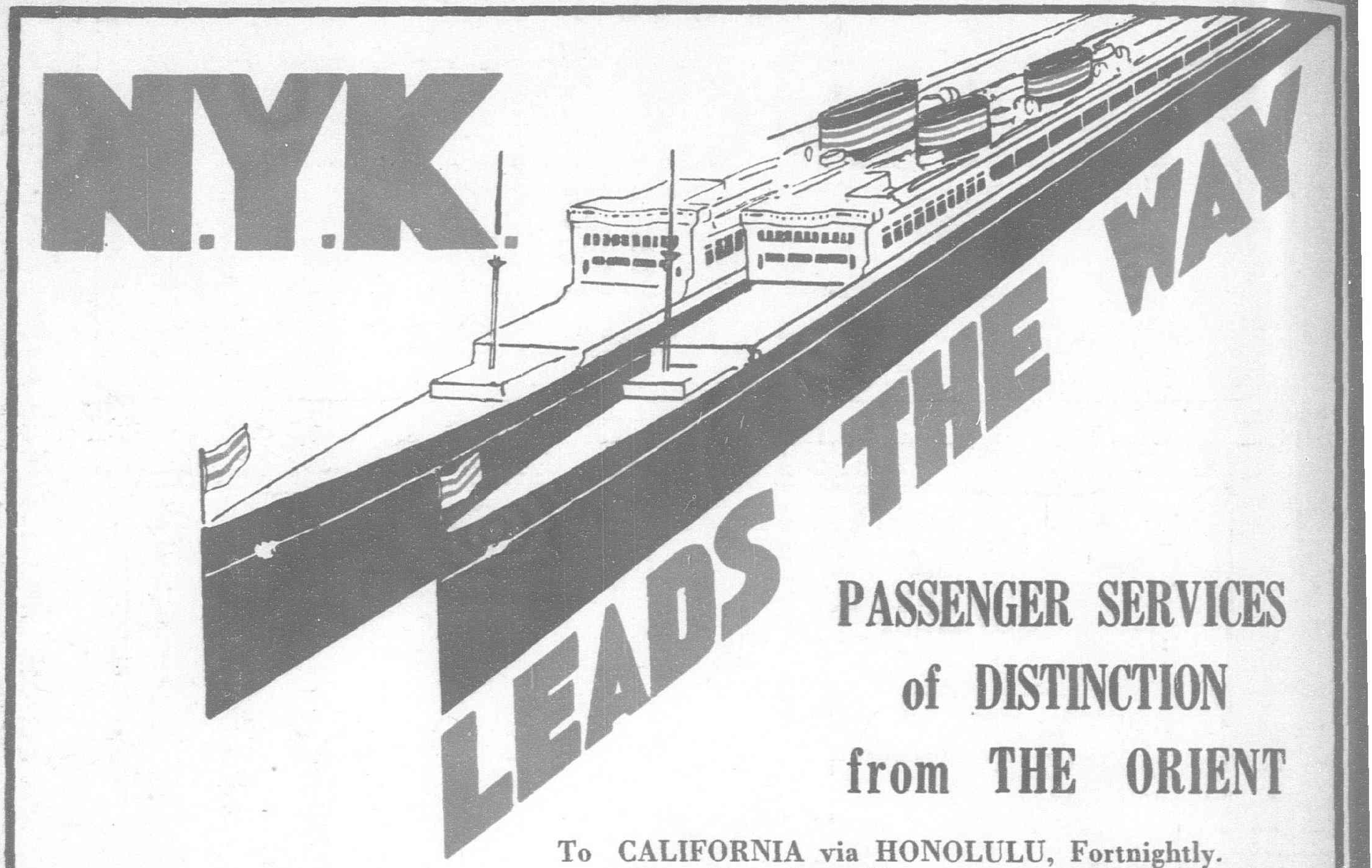
By George E. Sokolsky

CHINA'S GREATEST REQUIREMENT: PEACE

A Report by Mr. T. V. Soong

Vol. XXVI March, 1930 No. 3

SHANGHAI, PEKING, TOKYO AND MANILA



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The Far Eastern Review

ENGINEERING FINANCE COMMERCE

Vol. XXVI SHANGHAI, MARCH, 1930 No. 3

William Howard Taft

THE only two Presidents of the United States to have had Far Eastern experience previous to becoming President were William Howard Taft and Herbert Hoover. Mr. Taft was President of the U.S. Philippine Commission which organized the civilian government of the new American possessions; he was the first Governor-General of the Philippines; and in 1907, he again visited the Philippines, as well as Japan and China. When he became President of the United States on March 4, 1909, he possessed a rich Far Eastern experience and an intimate knowledge of Far Eastern problems and personalities.

The Hon. William Howard Taft

It was during his visit to Shanghai and Tokyo in 1907 that Mr. Taft presented the American policy in Asia with such succinct clarity that to-day when we re-read those speeches, we realize how little American policy has changed—or rather, how consistent American policy has been.*

Apparently at that time, there was some discussion as to the possibility of the United States selling the Philippines. To this, Mr. Taft replied (in his Shanghai speech):

> One word in respect to the Philippines before I come to America's relation to China. Americans interested in Oriental and Chinese trade naturally look to the Philippine policy of the government as having a bearing upon the attitude of America toward the Oriental in general. Reports have been circulated with an appearance of authority throughout this part of the world that the United States intends to sell the Philippine Islands to Japan or some other country. Upon that point, I do not hesitate to express a decided opinion. The Philippines came to the United States by chance, but that government assumed a duty with respect to them and entered into an implied obligation affecting them, with the people of the Philippines, of which it would be the grossest violation to sell the Islands to any other power. The only alternatives which the United States can in honor pursue with respect to the Philippines are either permanently to retain them, maintaining therein a stable government in which the rights of the humblest citizen shall be preserved, or after having fitted the people for self government, to turn the Islands over to them for the continuance by them of a government of the same character. It is enough to say here that there is not the slightest danger of a sudden cessation of the present relation of the United States to the Philippines, such as would be involved in a sale of those Islands, and that for our present purpose the attitude of the United States toward China must be regarded not alone as a country interested in the trade of China, but also as a power owning territory in China's immediate neighborhood.

This conception of America's relationship to China, based upon the propinquity of China and the Philippines, has not always been uppermost in the diplomatic mind, but that it has influenced American policy in China cannot be doubted. Had the economic history of either the Philippines or China been different during the past two decades, there can be little doubt but that neighborliness would have been a mere factor in the determination of American policy, but the independence movement in Japan and the revolution in China has unavoidably prevented American capital from coming to these countries and American trade from developing as rapidly as was anticipated in 1907, when Mr. Taft spoke of Sino-American trade in the following language:

> It is certain, therefore, that the American Chinese trade is sufficiently great to require the government of the United States to take every legitimate means to

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*These speeches are published in full in the October 1907 issue of the *Far Eastern Review*.

> protect it against diminution or injury by the political preference of any of its competitors. It can not, of course, complain of loss of trade effected by the use of greater enterprise, greater ingenuity, greater attention to the demands of the Chinese market and greater business acumen by its competitors; but it would have the right to protest against exculsion from Chinese trade by a departure from the policy of the open door. The acquiescence in this policy by all interested nations was so unhesitating and emphatic that it is hardly worth while to speculate as to the probable attitude of the United States were its merchants' interests injured by a violation of it. How far the United States would go in the protection of its Chinese trade no one of course could say. This much is clear, however, that the merchants of the United States are being roused to the importance of their Chinese export trade, that they would view political obstacles to its expansion with deep concern, and that this feeling of theirs would be likely to find expression in the attitude of the American government. Domestic business in the United States has expanded so enormously and has resulted in such great profits as to prevent American business men from giving to the foreign trade that attention which it deserves and which they certainly would give, but for more profitable business at home. As the population of the United States increases, as its territory fills and its vast manufacturing and agricultural interests become greater, its interest in foreign trade is certain to increase.
>
> The United States and others who favor the open door policy sincerely will, if they are wise, not only welcome, but will encourage this great Chinese Empire to take long steps in administrative and governmental reform, and in the development of her natural resources and the improvement of the welfare of her people. In this way she will add great strength to her position as a self respecting government, may resist all possible foreign aggression seeking undue, exclusive or proprietary privileges in her territory, and without foreign aid, and enforce an open door policy of equal opportunity to all. I am not one of those who view with alarm the effect of the growth of China with her teeming millions into a great industrial empire. I believe that this instead of injuring foreign trade with China would greatly increase it, and while it might change its character in some respects, it would not diminish its profit. A trade which depends for its profit on the backwardness of a people in developing their own resources and upon their inability to value at the proper relative prices that which they have to sell and that which they have to buy is not one which can be counted upon as stable or permanent.

It will be remembered that in the first decade of the twentieth century, an anti-Japanese movement developed in California and other parts of the United States, and that in both the United States and Japan, troublesome people were fomenting hatred and encouraging bitterness. Mr. Taft in a speech in Tokyo, at a meeting over which Baron Shibusawa presided referred to Japanese-American relations in terms of the warmest friendship. He said:

> "War between Japan and the United States would be a crime against modern civilization. It would be as wicked as it would be insane. Neither the people of Japan nor the people of the United States desire war. The governments of the two countries would strain every point to avoid such an awful catastrophe.
>
> What has Japan to gain by it? What has the United States to gain by it? Japan has reached a point in her history when she is looking forward with confident hope to great commercial conquests. She is shaking off the effects of war and is straining every nerve for victories of peace. With the marvellous industry, intelligence and courage of her people there is nothing in trade, commerce and popular contentment and enlightenment to which she may not attain. Why should she wish a war that would stop all this? She has undertaken with a legitimate intent in so close a neighbor to reform and rejuvenate an ancient kingdom that has been governed or mis-governed by fifteenth century methods. His Majesty, the Experor, has shown his appreciation of the difficulty of the task by sending to Korea Japan's greatest statesman who has exhibited his patriotism by accepting the heavy burden when by his years and his arduous labors for his country in the past he has earned a right to rest. No matter what reports may come, no matter what criticism may be uttered, the world will have confidence in Prince Ito and the Japanese Government are pursuing a policy in Korea that will make for justice and civilization and the welfare of a backward people. We are living in an age when the intervention of a stronger nation in the affairs of a people unable to maintain a government of law and order to assist the latter to better government becomes a national duty and works for the progress of the world. Why should Japan wish a war that must stop or seriously delay the execution of her plans of reform in Korea? Why should the United States wish war? War would change her in a year or more into a military nation and her great resources would be wasted in a vast equipment that would serve no good purpose but to tempt her into warlike policies. In the last decade she has shown a material progress greater than the world has ever before seen. To-day she is struggling with the abuses which accompany such material development, and is engaged in an effort by process of law to retain the good for her people and to suppress the evil. Why should she risk war in which all the evils of society flourish and all the vultures fatten? She is engaged in establishing a government of law and order and prosperity in the Philippine Islands and in fitting the people of those Islands by general education and by actual practice in partial self government to govern themselves. It is a task full of difficulty and one which many Americans would be glad to be rid of. It has been suggested that we might relieve ourselves of this burden by a sale of the Islands to Japan or some other country. The suggestion is absurd. Japan does not wish the Philippines. She has problems of a similar nature nearer home. But, more than this, the United States could not sell the Islands to another power without the grossest violation of its obligation to the Philippine people. It must maintain a government of law and order and the protection of life, liberty and property itself or fit the people of the Islands to do so and turn the government over to them. No other course in honor is open to it.
>
> Under all these circumstances then, could anything be more wicked and more infamous than the suggestion of war between nations who have enjoyed such a time honored friendship and who have nothing to fight for. "If this be true," some one asks, "why such reports and rumors of war?" The capacity of certain members of the modern press by headlines and sensational dispatches to give rise to unfounded reports has grown with the improvement in communication between distant parts of the world. The desire to sell their papers, the desire for political reasons to embarrass an existing government and their even less justifiable motives have led to misstatements, misconstructions, unfounded guesses all worked into terrifying headlines that have no foundation whatever. In each country, doubtless there are irresponsible persons that war would aid or make prominent who try to give seriousness to such a discussion, but when one considers the real feelings of the two peoples as a whole, when one considers the situation from the standpoint of sanity and real patriotism in each country, it is difficult to characterize in polite or moderate language the conduct of those who are attempting to promote misunderstanding and ill-feeling between the two countries.
>
> It gives me pleasure to assure the people of Japan that the good will of the American people toward Japan is as warm and cordial as ever it was and the suggestion of a breach of the amicable relations between them finds no confirmation in the public opinion of the United States. It is exceedingly gratifying for me to have as my companion in my visit to these shores, Mr. O'Brien, the new Ambassador to Japan from the United States. We have been friends for years. I am sure you will find in Mr. O'Brien all that could be desired in one whose chief official duty will be to preserve the friendship between our two countries.

This speech may well be compared with that recently delivered in Tokyo by Ambassador William R. Castle, Jr., which was published last month in the *Far Eastern Review*. Both sought to undo the mischief of professional trouble-makers. Both sought to impress upon the Japanese people, the permanent character of America's friendship for Japan, and both seek for co-operation in policy on the mainland of Asia. It is one of the curiosities of mass psychology that incontrovertibly authoritative statements of policy are ignored,

(Continued on page 116).

Japan's Trade in China

An Address before the Pan-Pacific Club of Tokyo

By GEORGE BRONSON REA

ALONG in 1919-20 it was generally hoped and assumed in China that the anti-Japanese boycott movement, centering about Peking and Shanghai, would so thoroughly stimulate the spirit of nationalism that China would forthwith enter upon a new era of national rejuvenation. It was during this period that numerous American manufacturers, including even Owen D. Young, came to China for the purpose of investigating the possibilities of investing their money in this country. American firms opened in such profusion that at one time there were as many as 300 in Shanghai. The Consortium was organized, and Mr. Thomas W. Lamont came to China.

It was a moment of grand opportunities, but it passed, and China settled down to a period of ceaseless civil wars from which she is not yet free. The business man at first was patient, but when the after-war economic slump hit China, many American merchants closed their doors and returned to the United States. Only the larger and better financed firms, such as the Standard Oil Co., Andersen, Meyer & Co., the American Trading Co., U.S. Steel Products, etc., remained to brave the storm. Similarly, most of the great industrial projects and the vast financial projects of that period were discarded and are now forgotten. The wonderful prosperity of the United States since 1924 contrasted with conditions in China since 1924 so disadvantageously to China that it has become increasingly difficult for the pioneering Americans who remained in China to interest their principals in extensions in this country.

Now the Editor of the *Japan Chronicle* takes Mr. Rea to task for having delivered the address which is reprinted below. It is difficult to understand exactly what the learned gentleman in Kobe is talking about, except that he malevolently spits venom at Mr. Rea, fumes when anyone speaks well of Japan, and generally places himself in the category of a "die-hard" who regrets the good old days of Kobe, when a few old-fashioned merchandizing firms acted as the middle-man between Japan and the world. His criticism of Mr. Rea's speech is largely from that point of view. Mr. Rea calls attention to a fact, namely, that Japan is selling a vast quantity of American goods in China and that this economic condition has certain specific political connotations. That the fact is as Mr. Rea states it, the editor of the Kobe sheet does not deny ; but he questions Mr. Rea's conclusions and impeaches his sincerity. This is not at all surprising. The *Japan Chronicle* has always been so antagonistic to Japan that it must dislike any person, like Mr. Rea, who comes to believe that the peace of the Pacific depends upon friendship between the United States, Japan and China. As these three nations grow closer to each other in economic and political reasons, as peace and harmony, rather than war and hatred, become their style, such editors find that their concept of the political state of the Pacific has been ridiculously shallow and anti-social.—ED.

Mr. Rea's speech at the Pan Pacific Club in Tokyo follows :—

It is not always easy to choose a subject that will interest an audience which by this time must be satiated with talks on Pacific relations. There are so many phases of the complicated questions which go to make up the so-called Pacific problem that it is hopeless even for a trained observer to encompass them all in a brief ten-minute talk. Reduced to its lowest equation, the solution to these problems resolves itself into a permanent peace and understanding in the Pacific Basin, which can be attained only by full, frank and harmonious co-operation between the United States, Japan and China, For the past eleven years, or since the Paris Peace Conference, in my limited capacity as an editor and publicist I have consistently advocated and fought for a better understanding between America and Japan as the first step towards a fuller co-ordination of their policies towards China. No peace can be permanent in the Pacific as long as there exists suspicions of each other's aims in China on the part of America and Japan. It is therefore a source of great personal satisfaction to see that the program I have so vigorously upheld now constitutes the basic policy of the American Government. In my opinion, the speech of Ambassador Castle before the Japan-American Society last month is the most important and far-reaching pronouncement of America's Far Eastern policy since the promulgation of the Hay Doctrine of the Open Door. This epoch-making address is still fresh in the minds of this audience, but I wish to stress the following extract :

> **"Even more absurd, it seems to me, is the talk one sometimes hears of friction between Japan and America in the development of the great potential markets of China. There, more than anywhere else, should there be co-operation instead of rivalry. Just as we should always work together to advance political stability in China, so we must inevitably co-operate in the sale of our merchandise. Japan seeks American raw material to manufacture what the Chinese want. America needs the goodwill of the Japanese traders in China in the distribution of American-made goods. Both must gain if we work together, as I believe we shall. I can see no possibility of friction in the growing trade of the two nations in all parts of the world, but only of fuller understanding and friendship. And this is particularly true as to China. We may differ at times as to the best method of helping the Chinese to attain political and economic stability, but our fundamental aims are identical—the upbuilding of a prosperous and contented nation."**

When I advanced the same argument based on the same facts ten years ago this month, the editor of my magazine publicly announced his resignation ; the American and Chinese Chambers of commerce, then dominated by rabid, anti-Japanese agitators, applied a boycott to my magazine, resulting in the loss of all my American and Chinese advertising. A trumped-up flimsy libel suit was brought against me for an amount equalling the full value of my property, so that in the event the decison went against me I would be forced to sell out and leave the country.

Fortunately, these conditions no longer exist. The war-mongering trouble-makers who for some years dominated the American business community and attempted to dictate the policy of the Government at Washington have been relegated to a back seat. Their influence no longer counts. The American business men in China are beginning to realize that co-operation with Japan is a fact they cannot ignore. It already exists. It is true that they are not wildly enthusiastic about this new trend in trade relations, but they are sensible enough to recognize facts when they see them. They would prefer that all American exports to China passed through their hands and that co-operation should be confined to Americans and Chinese in the development of China. But they learned from experience that the much-talked-of co-operation between Chinese and American capital is not altogether what they hoped it would be. The co-operation between American and Chinese capital in the development of Chinese industries has so far been somewhat of a one-sided affair, in which Chinese capital has taken advantage of the China Trade Act to operate under American law and escape taxation from their own authorities. American capital has not flowed into China to create the industries which it was hoped would serve as the foundation of an immense American trade in machinery and supplies. But where American and Chinese co-operation has failed to materialize, Japanese-American co-operation has made immense progress.

Few people who listened to Ambassador Castle's speech realize just how far this co-operation between America and Japan already extends in China ; how increasingly necessary it is for American manufacturers to have the good-will of the Japanese trader in that market ; how vital it is for Americans to work in harmony with the

Japanese for the development of China's resources. The object of this short talk is to explain how far this co-operation already exists. Two years ago I listened to Mr. Uchiyama, the acting Japanese Consul-general in New York, address a meeting of American business men. In the course of his speech he made the statement that at least 40 per cent. of the total American exports to China was handled by Japanese firms. I asked him for the figures to support his statement, and he referred me to Mr. Kashawage, manager of the Yokohama Specie Bank in New York. Mr. Kashawage told me that his bank alone handled over $40,000,000 of exports to China through the Japanese firms in New York. But, he added, there are five other important Japanese bank branches in New York through which business is done, and I am ignorant of the volume passing through them. These other Japanese institutions, the Mitsui, Mitsubishi, Sumitomo, Taiwan, Chosen and Fujimoto Bill Brokers' Banks, certainly get a fair share of the Japanese business, especially those operated by the three big trading firms. It is therefore fair to estimate that the total volume of China's export business passing through the five Japanese banks will approximate $50,000,000, a rather low estimate.

Now the toal value of American exports to China averages about $100,000,000 a year. Sometimes it is higher, sometimes lower. Two years ago $100,000,000 was a fair average. Of this total, fifty to sixty per cent. represents oil and tobacco, a trade that is exclusively in the hands of American firms. The balance, forty to fifty millions, represents general commodities. If the Japanese firms in New York are doing a business of $40,000,000 a year in exporting American products to China, obviously the trade is confined to general commodities and would substantiate the statement of the Japanese Consul-general that Japanese firms handled about 40 per cent. of all American exports to China. This means that, outside of oil and tobacco, the Japanese are selling more American goods to China than our own firms.

This doesn't sound reasonable, and the mere statement invites an immediate challenge. How can it be possible, with all the American firms in China, for the Japanese to sell more American goods than they can? And yet it is quite understandable. It is sometimes overlooked that the Japanese have invested over a billion yen in industrial enterprises in China, embracing the great South Manchuria Railway system, half the cotton spindilage, flour, oil, cement, and sugar mills, machine shops, mines and a multitude of other manufacturing plants. It is a fair estimate that something like ten per cent. a year on the capital investment goes into supplies, spare parts, renewals and extensions, so that we have here a market created by Japan amounting to about $50,000,000 annually. This market belongs to Japan. Japanese capital created it and controls its purchases. No one can take it away from her. In addition to the $50,000,000 annual expenditure to maintain these plants, there are the raw materials purchased abroad to keep them in operation. Japan purchases at least seventy per cent. of all the American cotton exported to China. This item alone amounts to about $10,000,000. It is natural that the Japanese will purchase the bulk of the requirements for their China industries in the Home market, but there is a wide margin that must be purchased abroad. These rough figures will help us to understand why the Japanese traders in China and New York are the best customers for American general commodities and how they are able to sell more American goods in China than the American firms on the ground (always excepting oil and tobacco). They control their own market, a most profitable one that carries them along when the merchants of ther countries, selling exclusively to the Chinese, are grumbling about hard times.

But this is not all. It is only one side of the picture. Japan's co-operation in distributing American products in China is not confined to direct exports from America. A very important percentage of Japan's own exports to China are manufactured from raw or half-finished materials imported from the United States. The amount of American raw materials which enter into Japan's manufactured products exported to China varies with the class of goods. In discussing this phase of Japan's trade with China with one of Japan's foremost authorities on the subject, he sent me the other day a brief résumé of the percentage of American raw materials which entered into the manufacture of the finished product exported to China. This detailed list is too long to quote at this time, but the figures show that roughly ten per cent. of Japan's total exports to China is taken by American material. This list was far from complete, and did not include assembled automobiles, black sheets and other half-finished commodities on which a drawback is allowed when exported. The total amount of American material entering into the finished product exported from Japan to China is perhaps nearer twenty per cent., or a valuation of approximately Y.100,000,000. When this is taken into consideration, and the amount added to the value of the direct exports of American goods to China through Japanese firms, we have a total of nearly $100,000,000 of American raw and finished products that find their way to the Chinese market through the agency of the Japanese traders. These figures may not be absolutely correct, but they are near enough to the truth to compel us to give pause and consider whether it is worth while to cultivate the good-will of such a customer and to co-operate with him in every way possible. Japan's prosperity and trade expansion in China carries no menace to the United States. Japan to-day is the best salesman of American goods in the Orient. Americans will never manufacture the low-grade goods required for the Chinese market. Japan, on the other hand, with her cheaper labor, superior organization in special lines, knowledge of the markets and other advantages, can take our raw materials and find an outlet for them in China and other parts of Asia where we could never secure a foothold.

I see no good reason why co-operation between the two countries for the stabilization of China into a prosperous and contented nation should not in time meet with the hearty endorsement of the Chinese themselves. I have always contended that such co-operation in itself is the greatest guarantee for China that her sovereign rights will be respected. It removes all causes for China's dubiousness of Japan's sincerity and brings the three nations together in a bond of common understanding that will assure that permanent peace in the Pacific which is the goal of American and Japanese diplomacy.

* * *

In determining the amount of American materials entering into the manufacture of Japanese goods exported to China, the percentage varies considerably. In *Cotton Fabrics*, which Japan exports to China to the value of Y.186,260,000, the percentage of American materials used in Gray Goods is about 10 per cent., for Bleached Goods, 50 per cent., and Coloured Goods 25 per cent. The total value of American material entering into Japanese Cotton Fabrics exported to China is estimated at about Y.48,036,000.

Japanese Flour, exported to China to the value of Y.25,265,000, is generally of the lowest grades and is manufactured from about 70 per cent. Canadian wheat, 20 per cent. American and 10 per cent. from other countries. The ratio, however, varies according to the year and the prevailing market prices. In this item about Y.3,328,000 is credited to American wheat.

In *Machinery*, which Japan exports to China to the value of Y.11,224,000, it is not so easy to determine the exact percentage of American material used, owing to the drawbacks allowed on the finished goods exported. It can be only roughly estimated from the proportion of the steel imported from all other countries. The estimate on the total exports is placed at Y.1,500,000.

In *Iron Ware*, which Japan exports to the value of Y.6,693,000, about Y.1,200,000 of American raw products enters.

Cotton Yarn, exported by Japan for the Chinese market, valued at Y.9,452,000, is about one-third American cotton, or Y.3,500,000. The yarns for the Manchurian and North China markets are for the most part of coarse counts in which American cotton is seldom used, while the yarns for Central and South China is largely of 40 to 42 counts.

In *Hosiery*, which Japan exports to the value of Y.3,193,000, about 26 per cent. of American cotton is used.

On the balance of Japan's exports to China, amounting to Y.290,107,000, which includes tin-plates, assembled automobiles and many other items on which the manufacturer is allowed a drawback, a rough percentage of ten per cent. should be allowed for American materials. Japan's total exports to China are valued at Y.532,194,000, and on the principal items above listed the amount of American raw material used in their manufacture is valued at Y.58,364,000, without including the rough ten per cent. on the balance of unlisted items valued at Y.290,107,000. If this percentage be included, it would bring the total value of American materials used in the manufacture of Japanese goods exported to China to Y.87,000,000.

(Continued on page 116)

The New Sino-Japanese Tariff Treaty

By GEORGE E. SOKOLSKY

THE Soong-MacMurray Treaty was signed on July 25, 1928 but the new Sino-Japanese Tariff Agreement is concluded as we go to press. This lapse of almost two years between the signing of the first Tariff Treaty and the last one explains in no uncertain terms the difficulties which beset Sino-Japanese relations. The misunderstanding regarding the Sino-Japanese Commercial Treaty of 1896 seriously embarrassed the diplomatic officers of both countries, who were left without a basis for negotiations. The refusal on the part of China to accept Mr. Obata as Japanese Minister, in succession to the late Mr. Saburi, further complicated an already unsatisfactory situation. Nevertheless, there were men in both Tokyo and Nanking who realized that a way to harmony and understanding between the Chinese and Japanese people had to be found. And the present treaty, which was negotiated by Mr. Shigemitsu for Japan, and Mr. T. V. Soong and Dr. C. T. Wang for China, is the result of this decision.

The contents of the treaty are not yet available for publication, as they have not yet been ratified by either Government. It is expected, however, that the treaty will be signed during this month of March, and that the Treaty will be published shortly thereafter. It is of the utmost importance that this treaty should receive early and full publicity, as the failure to publish the agreement for the evacuation of Japanese troops from Tsinan led to a recrudescence of anti-Japanism and was of no particular advantage to the National Government. The present treaty cannot suffer from publication, whereas any attempt at suppression can only lead to misunderstanding.

It has been freely admitted by both the Japanese and the Chinese that the new treaty is not a perfect document: it has not solved all the outstanding problems between China and Japan. It will not prove wholly satisfactory to the Chinese and Japanese people. *But the fact is that it is the best treaty which could be arranged in the present circumstances: it provides a transitory modus operandi until such a time as a new commercial treaty has been signed.* It brings Japan within treaty relationship with China concerning the tariff. It provides for reciprocity on certain items of import into either country. From this standpoint it is an exceedingly valuable treaty.

It was hoped that immediately following the signing of this treaty China and Japan would enter into negotiations with regard to other questions, but these may be delayed because of renewed fighting, although if the Nanking Government comes out of the present war unscathed, it may be assumed that fighting in Honan is little more than crime suppression in Chicago. It is therefore to be assumed that Mr. Shigemitsu will continue his pourparlers with Nanking. There can be no question of failure as long as there is good will and persistence on either side.

Unfortunately, there are in both China and Japan men who do not sympathize with the efforts to find a basis for harmony and co-operation between China and Japan. Most of these men are interested parties who thrive on hatred and confusion. Some are disinterested idealists, who have an intellectual conviction of hatred. No matter whether these haters are sincere or not, they involve their countries in irritating incidents, in an atmosphere of pinpricking annoyances. In China, in particular, a cult of anti-Japonism has been engendered by these incidents, so that a political person finds it advantageous to condemn Japan at every turn, while the responsible official who seeks to deal with Japan fairly on an equal basis with other countries is often condemned by his own people. There is no advantage in tracing the origin of this political phenomenon; suffice that it exists and that it has to be taken into account in all Sino-Japanese relations.

Even in Japan, there has been opposition by those who misunderstand the purport of the Treaty.

It was, then, most fortunate that the new tariff treaty reached the stage of initialling and that it will be signed. That opposition was aroused in China is known to all who watch the vernacular press; but compared with the usual opposition to anything involving Japan, it was like a whisper in the wind. Fortunately, Mr. T. V. Soong is a blunt, hard-spoken official who knows little about the intricacies of an official statement. When asked about the treaty, he brusquely said that he had to have a treaty with Japan on tariff questions, and that this was the best he could get. The official *Kuo Min News Agency* issued the following apparently inspired statement, which had the effect of even more definitely convincing the public that the officials were taking them into their confidence :—

> It is authoritatively confirmed that a tariff autonomy agreement between China and Japan was initialled at Nanking last week by Dr. C. T. Wang, Minister of Foreign Affairs, and Mr. M. Shigemitsu, *Chargé d'Affaires* for Japan, and has been transmitted to the respective Governments for final approval. Formal signature to the agreement and its public announcement are shortly to be expected.
>
> The signing of the agreement with Japan completes the series of treaties and agreements begun by the Treaty with the United States, signed on July 25, 1928, with the object of achieving tariff autonomy. It marks the final attainment of one of the major diplomatic aims of the National Government.
>
> For more than a year after all other countries had entered into tariff autonomy treaties with China, it had not been possible to arrive at an understanding with Japan. The new tariff schedule, put into effect on February 1, 1929 (and which was an adaptation of the original Seven Schedule Tariff arrived at after negotiations with the foreign governments in 1926), was agreed to by Japan only after protracted negotiations. To this day, owing to the Japanese control

Mr. M. Shigemitsu, Charge d'Affaires for Japan

(Continued on page 109).

China's Greatest Requirement: Peace

First Annual Report of the Minister of Finance, Mr. T. V. Soong

I HAVE the honor to submit a report of National Receipts and Expenditures of the 17th Fiscal Year of the Republic, July 1928 to June 1929, together with the more recent information of the ensuing six months, although complete figures for the latter period are not yet available.

With the fall of Peking by the Summer of 1928 the country was to all appearances, and in some phases, actually unified. But for the purpose of national finance, Szechuen, Yunnan, Kweichow, Shansi, Jehol, Suiyuan, Chahar, Shensi, Kansu, Sinkiang and the Three Eastern Provinces were, and still are with the exception of the Customs revenue, outside of the actual control of the Ministry of Finance. And it was not till late in the Spring of 1929, when Hankow was taken by Government forces, that the provinces of Hupeh and Hunan came under the financial control of the Government; it was not till the Summer of 1929, after the war in the South, that Kwangtung and Kwangsi became integral parts of the national authority; and it was only in the Summer of 1929, after the withdrawal of Japan and the retirement of Marshal Feng Yu-hsiang, that the national receipts and expenditures of Shantung and Honan came under the direct administration of the Ministry. These are the more clear-cut cases, but even in Kiangsi and Fukien financial control by the Ministry became a reality only towards the end of the fiscal year.

In presenting the statement of accounts for the year, the Ministry of Finance is thus not recording the national receipts and expenditures of the entire country, nor does it give a summary for only those areas of the country where financial control was effective during the entire year; rather is it offering a composite picture embracing the various areas where national financial control became effective at one time or another during the year. The figures given below therefore are of necessity incomplete; they contain the entire receipts and expenditures of the Central Government itself; they include, wherever possible, the receipts and expenditures, incomplete as they are, of more or less regional and independent authorities which came under the authority of the Central Government during the fiscal year; they omit the accounts of the areas where the Ministry of Finance did not administer the national receipts and expenditures:—

NATIONAL GOVERNMENT OF THE REPUBLIC OF CHINA

STATEMENT OF RECEIPTS AND DISBURSEMENTS FOR THE SEVENTEENTH FISCAL YEAR JULY 1928 TO JUNE 1929

RECEIPTS

(A) Revenue:		
I. Taxes:		
1.—Customs duties	$179,141,917.18	
2.—Salt	29,542,421.46	
3.—Rolled Tobacco and Kerosene	27,691,337.60	
4.—Tax collected by provinces	14,543,819.23	
5.—Tobacco and Wine	3,549,380.41	
6.—Stamps	3,034,342.96	
7.—Flour	2,037,921.71	
8.—Parcel Post	923,073.53	
9.—Mining Tax	90,182.19	
		$260,554,396.27
II. Miscellaneous Revenue:		
1.—Examination of deeds	1,860,019.88	
2.—Fines	40,899.80	
3.—Sale of confiscated property	14,660.88	
4.—Registration fees	3,130.00	
		1,918,710.56
III. Unclassified Revenue:		
1.—National revenue collected by provinces and directly disbursed for military expenses	62,381,597.86	
2.—Miscellaneous	7,624,846.16	
		70,006,444.02
		$332,479,550.85
(B) Refunds:		
I. Return of Russian Indemnity	$1,699,026.26	
II. Refunds of expenses and advances	117,890.71	
		$1,816,916.97
(C) Bonds, Treasury Notes and Loans:		
I. Bonds	44,506,129.01	
II. Treasury Notes	24,048,471.98	
III. Loans	28,077,995.45	
IV. Overdrafts	3,511,648.66	
		100,144,245.10
Grand total		$434,440,712.92

DISBURSEMENTS

(A) Current Purposes:		
I. Party Expenses		$4,040,000.00
II. Civil Establishments:		
1.—State Council & Subsidiary Organs	$4,098,791.51	
2.—Executive Yuan ,, ,,	22,327,554.90	
3.—Legislative Yuan ,, ,,	464,300.00	
4.—Judicial Yuan ,, ,,	504,318.71	
5.—Examination Yuan ,, ,,	245,000.00	
6.—Supervisory Yuan ,, ,,	448,429.50	
		28,088,394.62
III. Military Establishments:		
1.—Disbursed by Central Government	147,155,371.63	
2.—Disbursed directly by Provinces	62,381,597.86	
		209,536,969.49
IV. Other Disbursements:		
1.—Subvention to provinces	3,627,936.96	
2.—Miscellaneous subvention	1,081,104.50	
3.—Refunds of taxes and deposits	703,946.43	
4.—Miscellaneous	612,484.17	
		6,025,472.06
		$247,690,836.17
(B) Debt Service		121,318,007.57
(C) Indemnity		38,663,189.79
(D) Advances for Capital of Central Bank		20,000,000.00
(E) Suspense		6,768,697.39
Grand total		$434,440,712.92

In inspecting the Statement rendered above, attention is first drawn to the borrowing of $80,000,000* for current expenditures from a country already embarrassed by civil war, banditry and economic maladjustment. To understand the situation we must remember that: (1) at the beginning of the fiscal year, and during a considerable part of the twelve months, although the Government had to undertake the responsibilities of the entire country, it had at its actual disposal the revenues of only five provinces, except for the Maritime Customs revenue; (2) during the fiscal year it had to undergo three major military campaigns to prevent internal disruption.

Compared to the previous fiscal year, the 17th year already showed a great improvement, for during a large part of the 16th year more than three-quarters of the expenditures had to be procured from loans raised in the two provinces of Kiangsu and Chekiang. As the mere publication of the figures during the period of military operations might have resulted in a panic, possibly disastrous to the Northern Expedition, it was not until the Disbandment Conference in January 1929 that the figures of receipts and expenditures were finally published.

Even taken by itself, the 17th Fiscal Year showed noteworthy improvement, since during this period the national authority as a whole steadily extended in area and control and improved its machinery of taxation, till at the end of the fiscal year, by the summer of 1929, the Government was almost in a position to balance its budget without resorting to borrowing for current expenditure, and for the first time in almost twenty years to break the vicious circle of living on loans secured on current revenues, which inexorably leads to more and more loans in the future. The last few months since then have shown unfortunate retrogression, for with the revival of civil war on a large scale expenditures have mounted, revenues have fallen, and the clutching hands of the militarists, never completely stilled, once more reach out to seize Government revenues and indulge in wholesale smuggling. But that does not vitiate the lesson of the 17th Fiscal Year, which is, that with the re-establishment of peace and order the Government revenues would increase by leaps and bounds, so that in a brief space of time the budget could be balanced, money spared for constructive purposes, and the domestic and foreign credit of the nation restored. The bais of our national economy is truly sound and only awaits peace and order to exhibit its colossal strength.

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* Not including $20,000,000 borrowed for capital for the Central Bank.

A close survey of the development of specific revenues serves to illustrate the progress made in financial reforms during the past year:

CUSTOMS.—With the conclusion of tariff autonomy treaties with all the important trading countries excepting Japan, a new tariff was made effective from February 1, 1929, and was operative for five months of the fiscal year. The new tariff superseded the 5 per cent. conventional Customs tariff and the 2½ per cent. surtaxes, which latter were collected by the National Government where it had control, and in other ports by regional authorities. The absorption of the 2½ per cent. surtaxes and the surtax bureaux, although an obvious necessity, was accomplished only after the greatest difficulties. One further step in the same direction was the incorporation of the Kerosene Excise Tax into the new tariff, which did away with the special bureaux for this tax.

The results of the new tariff as a whole have been satisfactory, although the increased receipts have been in part offset by greater expenditures to cover the cost in silver of the service of foreign gold obligations. The present sharp fall of the price of silver, itself an indication of the lower buying power of the people, has tended to make foreign imports more expensive, and during the last few months has resulted in a substantial decline of Customs receipts. Motivated principally by the desire to protect the service of Government obligations from the vagaries of exchange, the Government on January 15, 1930, ordered the collection of import duties on a gold basis commencing February 1, 1930.

So long as the old five per cent. tariff was in effect there was little incentive to smuggling. With the introduction of the new graduated tariff smuggling has become a problem, particularly in the South, with Hongkong as the base. The free port of Hongkong, its proximity to the mainland, its vast uncontrolled junk traffic and the restrictions of the unequal treaties, which made the bays surrounding Hongkong as far as the water edge British waters, make Hongkong an ideal base for smugglers, although obviously the Hongkong authorities are not interested in making it so. Unless satisfactory arrangements can be made with Hongkong, or more drastic means of prevention employed, the British colony will remain a thorn for the Customs Administration and cause a serious drain on revenue.

Until the Summer of 1928 the Customs Administration under the nominal control of the Shui Wu Chu at Peking, was a thoroughly denationalized administration, with the Inspector-General jockeying between the Legations and the Government for instructions and opinions. In June 1928 the Shui Wu Chu was abolished and the Customs Administration placed under the Kuan Wu Shu, which is an integral part of the Ministry of Finance. The policy was initiated that while the administrative integrity of the Customs with its civil service traditions would be maintained, the Customs should concern itself solely with the collection of revenue in implicit obedience to the orders of the Government and divest itself of all political and extraneous functions and associations. In so doing the Customs has only improved its position and reputation and increased its usefulness.

Mr. T. V. Soong, Minister of Finance

Another anomaly which is being remedied is the discrimination which has existed against Chinese in the higher ranks of the Customs service: for fifty years no Chinese reached the rank of Commissioner of Customs. The principle has now been laid down that promotion is based solely on merit and that there will be no recruiting of foreigners for the service except for technical work under the direct instruction of the Minister of Finance. At the same time the Customs is recruiting more highly trained Chinese into the service, and during the year graduates of universities abroad have been admitted after careful examinations. Further, with a view to improving the standard of our nationals in the higher ranks, several present members of the Customs Administration, who are already graduates of colleges in China, have been sent to England and America to study the Customs administrations there.

Since the inauguration of the new policy of the Government, which has been loyally observed by the present Inspector-General, one Chinese has become a full commissioner, seven have become acting commissioners, one has become a deputy commissioner, and eight have become acting deputy commissioners. The general result of the policy has been a more harmonious working together of all nationalities in the Customs service, and the smooth transition on February 1, 1929, from the flat five per cent. tariff to the more complicated new graduated tariff is itself a proof that the Customs Administration is functioning efficiently.

SALT.—At the beginning of the fiscal year the salt revenue was at a very low ebb, both as regards revenue collected and in point of administration. The Central Government had then actual control of the revenue of only three provinces, Kiangsu, Chekiang and Anhui, and a large portion of this revenue was already pledged for war loans. In point of administration the Salt Inspectorate, which was the sole unifying factor of what has always been a loosely-administered revenue, was all but disintegrated. How the revenue picked up till, before the recrudescence of civil war, in the Autumn, it rivalled the halycon days of the Salt Gabelle, illustrates how great a surge forward is possible if only peace and order can be restored.

Recognition was early made of the use to which the Salt Inspectorate with its civil service traditions and experiences in salt administration might be put, despite the low estate to which it had fallen and the popular opposition to what was considered an anti-Nationalist collecting agency of the creditors. On September 26, 1928, the National Government issued instructions whereby the service of the salt loans was directly charged to the Minister of Finance and the Salt Inspectorate was made an integral division subordinate and responsible solely to the

Ministry of Finance. At the same time, it was provided that the Salt Inspectorate Service should be restored throughout the country, but that where the revenue could not be remitted to the Central Government, at any rate a fixed quota of the revenue, sufficient to pay for an apportioned share of the loan service as a first charge, should be remitted to the Treasury. This quota plan, after some preliminary difficulties, eventually succeeded, and by this scheme a total equivalent to $9,600,000 was paid to the foreign bondholders during the year 1929. By September 1929 the scheme had proved so successful that the Ministry was able not only to announce provision for payment of one year's obligations annually, but also to adopt plans to clear the arrears.

During the fiscal year the success that attended the Government in consolidating its authority enabled the Ministry to spread its area of control throughout the Yangtze Valley, into Hopei, Shantung and the Southwest. Where its authority extends the Ministry strives to secure uniformity of the rate of taxation and methods of collection, to consolidate the various surtaxes under the sole control of the Salt Inspectorate, to abolish the old system of farming out taxes, to institute better control of the preventive service, and to extend the depôt system so that revenue can be collected at the source.

In all the reform measures outlined above the ground has been barely scratched, because they all presuppose cessation of military activities. Nevertheless the receipts had been most promising, increasing steadily month by month till by September, 1929, the last month before the outbreak of military conflict, the revenue for the month attained $12,245,000, of which 60 per cent. went to the Central Government for loan service, administrative expenses and for the general use of the Treasury. Since that month, owing to the disruption of communications, wholesale smuggling by the militarists and trading disturbances, the revenue fell sharply, but it has been abundantly shown in the brief period that the revenue is capable of rapid improvement, given a modicum of peace and sound administration.

Revenue since July 1929

July	$8,905,943
August	8,738,908
September	12,245,726
October	11,156,885
November	9,267,794
December	7,204,700

Tobacco and Wine.—Probably in the case of no other tax is there greater room for improvement than the Tobacco and Wine Tax. At the same time fewer taxes are collected with greater difficulty, especially in the case of wine, as there is concentration neither in the area of consumption nor of distribution. Production is widely scattered, collection agents are numerous, and every incursion of banditry or outbreak of civil war immediately puts a stop to receipts. Until the country is more closely knit together and enjoys a long period of peace, a radical change in the methods of collection seems unwarranted, and the policy of the Ministry has been to continue the existing system and to run it as best possible. A commission of experienced administrators was organized by the Ministry to devise improvements, using the present system as a basis, and the results of their study are published in book form. Where the Ministry of Finance has had unimpeded control there have been substantial increases in revenue, as the following figures show:

	Kiangsu	*Chekiang*	*Anhui*	*Kiangsi*
16th Year	$836,403	2,422,387	265,297	565,000
17th ,,	1,113,790	2,612,627	583,737	295,404
18th ,,	1,801,455	2,635,196	1,000,000	601,000
	Fukien	*Hupeh*	*Shantung*	*Hopei*
16th Year	$476,305	550,933	1,083,987	1,720,994
17th ,,	621,044	880,331	427,371	1,446,058
18th ,,	1,000,000	1,200,000	1,526,992	2,190,442

The figures for the 18th Fiscal Year show only the estimated receipts of the tax after various improvements have been made, but the receipts of the first six months have shown that the actual receipts tally very closely with the estimates, except where civil war has upset collection.

Stamp Tax.—Developments of the Stamp Tax Revenue have followed the line of enforcing the use of uniform stamps throughout the country, even where the revenue does not necessarily accrue to the Central Treasury; the abolition of the tax farm system, whereby an annual contribution is made in lieu of the actual use of stamps; and the introduction of the tax into the foreign Settlements. Although this tax has become an important item in the revenue of other governments, any substantial increase at present in China is hardly possible, and great patience is called for. This is bound up with the fact that as the tax falls directly on the individual, unless the habits of affixing stamps are already formed or the Government exercises a very strong hand, increase in revenue could only be gradual.

Kerosene Tax.—Prior to the formation of the Nationalist Government receipts from kerosene and gasoline had been very meagre, and took the shape of the conventional Customs duty, together with numerous and vexatious imposts by provincial authorities, municipalities and even local educational and charitable bodies. After the greatest obstacles, involving difficulties with both the oil companies and Government and semi-private institutions, the consolidated kerosene tax was finally put in force. When the oil companies found that the consolidated tax system meant a uniform tax collected at the source and afforded them immunity from petty annoyances, they responded wholeheartedly in spite of the relatively high rate of tax imposed. It was with the revenue from this tax that a large bond issue was floated to carry on the Northern Expedition.

As kerosene and gasoline are entirely articles of import, taxation could best be levied at the Customs. For that reason, and also in order to avoid unnecessary duplication of the machinery of collection, the tax was amalgamated into the general Customs duty when the new tariff came into effect on February 1, 1929, and the bond issue secured on the tax became a charge on the Customs.

Rolled Tobacco Tax.—Under the Peking Government, apart from the Customs duty of five per cent for imported cigars and cigarettes, there were a factory tax of 2½ per cent. and innumerable imposts by regional, provincial and local authorities, along with the usual levies by educational and charitable associations. When the receipts from these sources proved meagre certain provinces attempted ill-conceived schemes of monopolies, with consequent further restraint on trade without any compensatory gain in revenue. Foreign cigarette companies, ensconced behind the security of the Settlements, refused to come to any arrangements with the Government, and the Settlements became the center of vast smuggling operations, in which many Chinese cigarette companies also freely participated. In January 1928 an agreement for a consolidated cigar and cigarette tax was arrived at with all the companies, whereby for all cigars and cigarettes of domestic or foreign manufacture, in addition to the Customs duty on foreign imports, a consolidated tax of 22½ per cent. was imposed. After several months of protracted negotiations with local authorities and organizations, the scheme was successfully carried out wherever the Ministry of Finance had direct control. Here again, when business men found that a tax was administered with impartiality and collected once for all, the responsible companies gave the Government every co-operation. By January 1, 1929, the tax was increased to 32½ per cent. for domestic manufacture and 40 per cent. for imported goods. The result of the tax has been very gratifying; as against the few hundred thousand dollars monthly receipts that used to be collected by every means throughout the country, the receipts from the provinces, where collections are made by the agents of the Ministry of Finance (exclusive of the Three Eastern Provinces, Shansi, the Northwestern and Southwestern provinces) have now reached almost four million dollars monthly, despite the recrudescence of civil war.

Revenue since July 1929

July	$2,807,928
August	2,931,323
September	3,154,426
October	3,630,319
November...	4,046,246
December	3,843,658

Likin.—General condemnation of the likin tax has always been confronted with the need of securing sufficient revenue from other sources to warrant its abolition. An attempt was made by a former Administration, in the Summer of 1926, to abolish likin by a mandate, but as the National Government then were in control of a very limited territory and had not found definite sources of revenue to replace likin, the measure was foredoomed to failure.

The steps taken by the Ministry to pave the way for removing likin have been two-fold: (1) The Land Tax was given up to the provincial governments in exchange for their claims on the likin revenue, so that the latter having become a purely national tax, its disposal by the National Government would be unimpeded. In most of the provinces this has been achieved, although the administration is allowed to remain for the time being in the hands of the former provincial nominees; (2) Arrangements were made to increase other forms of revenue, so that the sudden abolition of the likin could take place without causing a financial crisis to the Government. For a time the prospects for this plan appeared very hopeful, and by June, 1929, the Ministry was planning to abolish this vicious tax system by February 1, 1930. The revival of civil war in September, 1929, however, deferred the hopes then entertained of earlier action, but the National Government has on December 16, 1929, definitely set October 10, 1930, as the date for the abolition of likin and all levies of a similar nature. In making this announcement, it has categorically and unconditionally committed itself before the country; and whatever may be its financial position, business interests may be assured that what has been a main stumbling block to the free flow of goods within the country, and for more than half a century the most corruptive factor in the government of the country, will be finally removed by October this year. With the disappearance of likin many taxes associated with it, such as transit dues and internal parcel post duties, will be simultaneously removed.

CONSOLIDATION AND IMPROVEMENT OF TAXES.—Despite frequent irresponsible statements to the contrary, no new forms of taxation have been inaugurated since the establishment of the National Government at Nanking. The provincial, municipal and local taxes may have been multiplied, but national taxes have not been increased in number, and indeed the total number of these taxes may be counted on the fingers of two hands.

Instead of being guilty of loading down the people with many new taxes, the Ministry of Finance has been trying to consolidate and simplify the existing tax system. Thus the many salt surtaxes, each with its separate bureaux, are being concentrated in the sole charge of the Salt Inspectorate; thus also the Kerosene Tax and 2½ per cent. Customs Surtax Bureaux have been amalgamated into the Maritime Customs; and thus, also, the various taxes and imposts on cigars and cigarettes have been consolidated into a single tax, so that the principles of economy of operation and taxation at the source may as far as possible be secured.

The Parcel Post Tax, which many have considered as a new tax, was an old tax associated with likin, which was taken over from the provincial bureaux of finance, and, in 1928, in Kiangsu alone it immediately yielded three times the preceding yearly receipts. Similarly the newly instituted Flour Tax is a consolidated tax, superseding the innumerable likin imposts on wheat. Although the Flour Tax was lower than the combined rates of the various likin barriers, it yielded more than twice the revenue formerly collected.

Nor has the rate of taxation been appreciably increased. With the exception of the increase of tariff duties, which are still low compared to those of many other countries, and the Salt Tax, which in several provinces has been increased and in other provinces lowered to bring the rates to a more or less uniform level, there has been no actual increase in the rate of taxation.

The marked increase in revenue, therefore, has been achieved by improved administration, and, even more so, by the increased authority of the Central Government.

DOMESTIC AND FOREIGN UNSECURED INDEBTEDNESS.—Although during a great part of its life, the Government has been confronted with the mere task of defending its existence, it early realized the importance of dealing with the problem of the national indebtedness in arrears, and created a special Commission, consisting of the Chairman of the Executive Yuan and the responsible Ministers, to study the problem of its unsecured indebtedness. Much progress has been made, and it is expected that during the present year it will be possible to formulate some scheme of debt consolidation to the bondholders. As an earnest of its intentions the Ministry has been setting aside the sum of $5,000,000 annually to go towards the final scheme of liquidation.

The suggestion has often been put forward that the Ministry should attempt to obtain financial assistance by means of foreign loans, but it has been its policy studiously to avoid even negotiations in this direction, until there was assurance that the terms and conditions which could be offered prospective foreign purchasers of our bonds would be such as could be accepted and yet which would not imperil China's financial integrity. It has been the task of the Ministry during the past year to study the problem of China's indebtedness and to seek a formula for the consolidation of the entire public debt under the Ministry of Finance, so that a plan could be devised for sound public financing in the future on a basis honorable to China and satisfactory to prospective bondholders. At the same time the Ministry cannot emphasize too strongly that the process of restoring national credit is so painful and costly that no department of the Government should enter light-heartedly into engagements for which it is not fully prepared to shoulder responsibility. A mere suggestion that new obligations entered into by any branch of the Government are not fully lived up to is enough to reflect on the whole of China's credit abroad. Obviously as national credit concerns the entire Government, it must be dealt with as a whole.

BONDS AND TREASURY NOTES.—From time to time the Government has had to resort to large issues of bonds and treasury notes to carry on the military campaigns for the unification of the country and for the schemes for disbandment, although the various disbandment plans all miscarried. By investing these issues with gilt-edged security and with the organization of a special Sinking Fund Board of Trustees composed of representatives of banking interests and public bodies, which were called into being under a Government mandate and operate under a Government charter, a vast bond market has been created. Part of the interest in Government bonds has undoubtedly been due to the stagnation of trade, but the fact that the general public, apart from banking interests, have become increasingly large investors therein may be considered as a healthy sign.

Nobody realizes more clearly than the Ministry of Finance that the frequent issuance of these short term bonds and treasury notes does not make for well-ordered finance and cannot be justified except as temporary measures to meet military emergencies. But in the circumstances the Ministry has to work as conditions permit, and until peace and order have been generally attained and maintained, and far-reaching policies can be applied, government in all lines must remain to a large extent a matter of tinkering.

CENTRAL BANK.—The trials encountered by the Government banks at Canton and Hankow did not at all prove discouraging to the Government's intentions to organize a central bank. But until the close of the Northern Expedition the Ministry could not contemplate the risk of being obliged to finance military campaigns by unregulated issues of bank notes. And although the Bank was actually established on November 1, 1928, the regulations governing the operations and management of the Bank, particularly with reference to its bank note issues, were made unusually stringent, with public bodies closely participating in the supervision of its activities. These provisions have proved salutary, and although the Bank was forced to face serious political and military crisis, it weathered them all without difficulty. The growth of the Bank during its first year was quite satisfactory, and would have been even more rapid had anything like peaceful conditions obtained.

THE CENTRAL BANK OF CHINA

CONDENSED BALANCE SHEET AS OF OCTOBER 31, 1929

LIABILITIES

Capital	$20,000,000.00
Surplus	239,360.13
Notes in Circulation	20,269,063.00
Deposits	60,472,922.57
Net Profit	1,286,489.66
Total	$102,267,835.36

ASSETS

Cash :—		
On Hand	$18,767,516.61	
On Call with Banks	32,002,567.65	
		50,770,084.26
Reserve against Notes in Circulation :		
Cash	$14,341,123.00	
Securities	5,927,940.00	
		20,269,063.00
Loans and Overdrafts		21,349,170.67
Government Securities owned		7,116,249.15
Bank Premises		2,326,694.88
Furniture and Fixtures		121,062.38
Preliminary Expenses		68,762.05
Other Assets		202,052.14
Items in transit...		44,696.83
Total		$102,267,835.36

The cautious operation of the Bank has improved the financial credit and prestige of the Government. Even during the Bank's short existence it has had a remarkably calming effect on the market by lending money to the banks freely whenever the native interest rates soared at every appearance of a political or military crisis.

The Bank has taken over the sinking funds for domestic bonds which used to be deposited in the foreign banks. As the activities of the Government develop, the key position of the Bank will more and more enable it to become the basic factor in regulating the banking and currency situation of the country.

EXPERT COMMISSIONS.—Realizing the need of expert advice the Ministry has summoned various expert commissioners to study the method of treating the various problems confronting it. It summoned in the Summer of 1928 an Economic Conference, which presented the views of the banking and business interests. It also instituted expert commissions to study the salt and wine and tobacco taxes. Most important of all, it invited Dr. E. W. Kemmerer, who had similar experiences in many countries abroad, to head a Commission of American financial experts to study the currency and financial problems of the country, and to make recommendations on the chief phases of financial policy and administration, including monetary reform, revenue policy, budget, accounting control and the restoration of the national credit. These recommendations are embodied in a series of reports which are being prepared for the Government Council, and those which are of public interest will subsequently be published, so that the people may weigh and discuss the more important suggestions offered by the Commission.

Several of the members of the Kemmerer Commission have been retained after the expiration of their original contract, for service in the Ministry.

CIVIL SERVICE.—During the storm and stress of the Northern Expedition and the ensuing period of almost incessant military activities, the Ministry of Finance, like all Government institutions, had perforce to be content with getting whatever personnel that was immediately available. Careful selection of experienced administrators was, for the most part, out of the question.

The important task of installing an effective civil service system, which after all is the only genuine and lasting remedy for centuries of malpractices and actual corruption among Government officials, has now devolved upon the newly-organized Examination Yuan.

Pending the inauguration of the general plan of civil service reform under the auspices of the Examination Yuan, the Ministry of Finance has been trying to maintain and extend whatever basis for a civil service system that already exists among its departments. The Ministry has been jealously guarding the civil service traditions of the Maritime Customs and has further given over to the control of that service the most important inland Native Customs, those at Wuhu, Yangyu and Fengyang.

In the Salt Inspectorate the same policy has been adopted; in fact, the main reason for the resuscitation of the Salt Inspectorate by the Ministry was because of its well-conceived civil service system and its trained personnel. At present the Salt Inspectorate has been given full control not only of the collection of the duty proper, but is also charged with the collection of all local surtaxes of whatever nature. The civil service system has also, in some measure, been introduced into the Rolled Tobacco Tax Administration, which is the third most important revenue department. Appointment and promotion in the Rolled Tobacco Tax Administration has become a matter of routine, and a change of the head of the Administration was not attended by any change in the general staff.

The principal blot on our financial administration has been the operation of the likin system, the directors of which are appointed or nominated by local governments, although the tax itself has been designated as a national revenue. With such a cumbersome method of collection as is employed in the case of the likin tax, and with the multitude of tax officials functioning without proper control, honest administration is basically impossible, and the only relief lies in the total abolition of the likin system next October.

As the Maritime Customs, Salt Inspectorate and Rolled Tobacco Tax Administration are already operating under some form of civil service, the general application of the civil service system as such in the Ministry of Finance should not prove very difficult. Far more difficult will be the determination of the standards of staff treatment in the various departments of the Ministry of Finance, as the staffs of the Maritime Customs and Salt Inspectorate are paid at a very much higher rate than are other employees of the Ministry.

THE BUDGET.—With all the vicissitudes of civil war, banditry, famine and the fall in silver, which means a sharp decline in the purchasing power of the nation, it is nevertheless obvious that the financial problems of the country are not beyond solution. With relatively peaceful conditions and a budget to replace the present haphazard, hand-to-mouth, wasteful methods, by virtue of which the Ministry must depend upon expedients rather than operate on policies, rapid financial improvements may be looked for.

The Party early realized the need for a budget, in order that the Government may work along a conceived plan and the fullest publicity be given to its operations, so that public confidence could be maintained. It has, therefore, in the party platform enunciated as a main policy that a budget should be set up as soon as possible to guide the operations of the Government.

At every Plenary Session of the Central Executive Committee, at the Economic and Financial Conferences and at the Disbandment Conference, this Ministry has called the attention of the Government to the fact that without a budget of some sort, however imperfect it may be, the Government must live on a hand-to-mouth policy, all thorough-going financial plans are rendered impossible, and publicity, which is the mainspring of public confidence and provides the moral sanction for taxation, is difficult to furnish.

The main difficulty with the establishment of a budget lies, of course, in the inability of the Government to foresee and curb military expenditures. The Government on its part has not failed to exert every effort to restrict military expenditures. At the First Disbandment Conference in February, 1929, after the entire receipts of the National Government were reported in detail to the important military leaders, it was unanimously decided to fix the annual military budget at $192,000,000, besides the expenses of disbandment. Scarcely had the agreement been reached when the Kwangsi Clique rose in revolt, expensive military campaigns were conducted against Hankow and to defend Canton, and when these were being quelled the Kuominchun revolt broke out.

The failure of the Kuominchun encouraged the Government once more to organize a Disbandment Conference, and this time the annual military expenses were fixed at $216,000,000, besides $30,000,000 for disbandment purposes. Shortly after the close of the Conference, however, the Kuominchun was again in revolt, and scarcely had that been crushed when the revolt of Shih Yu-san's troops at Pukow, the mutiny of Tang Sheng-chi at Chengchow, and a renewed attack on Canton by the Kwangsi Clique and the so-called " Ironsides " again broke out. Once more the Government had to pour enormous sums of money into the conflict, and, in addition to the expenditure of reserves on hand, funds were raised by all means available.

The Statement of Receipts and Disbursements from July 1928 to June 1929 gives the total recorded military expenses as $209,536,969, but it must be remembered that this does not mean the total of military expenditures within the country. The military establishments of the Three Eastern Provinces, Jehol, Suiyuan, Chahar, Shansi, Shensi, Honan, Yunnan, Szechuen, Kweichow, Kwangtung and Kwangsi, some of which were maintained by all forms of irregular imposts, forced loans and advance collections, are not included therein, so the total military expenditures of the country are vastly in excess of either of the two figures established by the two Disbandment Conferences as reasonable and which could be met.

How to restrict military expenditures during the current year so that the Ministry of Finance can meet expenses without further mortgaging of the future and be able to begin to provide for reconstruction and debt consolidation reduces itself to the problem of attaining peace within the country, a problem which no single Ministry can be expected to solve. In the satisfactory treatment of this problem lies indeed the future of democratic government, economic reconstruction, foreign relations and financial progress, and therefore it constitutes the one challenge to the statemanship of the Government and the Party together with the support of the entire nation.

A Revelation in Engineering Efficiency

A Japanese Technical Mission Goes to Russia to Teach the Russian Engineers how to Repair Railway Rolling Stock

By GEORGE BRONSON REA

JAPAN leads the world in the efficiency of railway repair work. It comes almost as a shock to our self-complacency to learn that the engineers of the Japanese Government Railways have reduced the time required for a general overhaul of a locomotive to six days as compared with twelve in the United States, two to three weeks in Europe and forty to fifty days in Russia. Shop efficiency makes for greater transportation efficiency with less rolling stock. Reduction of the time taken for repairs cuts down the number of vehicles out of service and increases their earning power. Seventeen years ago, Japan was in the position where Russia is to-day, requiring over 41 days for the general repair of a locomotive. By 1917, the time was reduced to 13 days. It is now six days. This record shows wonderful progress and adaptability, which if applied to mass production along other mechanical lines, gives us some idea of Japan's capacity for organization and ability to compete with Western manufacturers.

As the result of a world wide investigation into railway repair practice, the Soviet Government recognized the superiority of Japanese methods and requested the Japanese authorities to assist them in solving their transportation problem. Twelve Japanese experts are now on their way to Moscow to teach the Russian railway engineers how to organize and manage their repair shops. The Russian railway problem is very similar to that which confronts China. It is not so much a question of raising funds for new construction or equipment as it is one of rehabilitation; repairing and replacing old rolling stock. Thousands of locomotives and cars scattered on the side tracks or parked in the railway yards throughout Russia are quite capable of repair. In most instances, the freight cars are in good condition requiring only flooring and siding, while minor repairs will suffice to place the majority of the locomotives in service. The Russian railway engineers have labored under heartbreaking handicaps since 1919 and achieved wonders with the materials at hand in repairing and putting into operation the masses of war-damaged rolling stock. The difficulty of finding cash or credit for new locomotives and cars has compelled the Soviet authorities to make a frantic effort to speed up their repair shops and utilize to the utmost the old materials side-tracked or parked in the scattered yards. The Soviet problem and progress made towards its solution is revealed in the following official figures:

In 1922-23, the Soviet Railways had a total of 19,525 locomotives of which 52.2 were in need of repairs; 1923-24, there were 20,208; 1924-25, 20,275 with 52.2 per cent. needing repairs; 1925-26, 20,456 with 45 per cent. needing repairs; 1926-27, 18,531 locomotives, with 39.9 per cent. needing repairs; 1927-28, 17,573 locomotives with 34.5 per cent. needing repairs.

In the matter of wagons, in 1922-23, there were 403,000, with 32.2 per cent. in need of repairs; 1923-24, 435,800 wagons with 30.9 per cent. in need of repairs; 1924-25, 445,400 with 26 per cent. needing repairs; 1925-26, 449,500, with 16.3 per cent. needing repairs; 1926-27, 542,300 with 13.2 per cent. in need of repairs; 1927-28, 468,000 with only 7.3 per cent. in need of repairs.

These figures indicate that the Soviet engineers have solved the problem of repairing the 134,000 useless wagons that cluttered up the side tracks in 1922-23, reducing the number in six years to 32,760. Their major problem lies in repairing the 5,162 idle locomotives representing an approximate capital value of over $200,000,000 gold. To do this, means either the enlargement of the shops or speeding up the work to get the maximum results out of the present equipment. The installation of additional plant to repair 5,000 locomotives (roughly equivalent to the total number in operation in Japan) would entail an enormous expenditure for new machine tools and shop equipment at a time when the Soviet Government finds it difficult to obtain credits. The one solution to the problem therefore was to speed up the work. Commissions of experts were sent abroad to investigate and report on the best shop methods of other countries. One of these commissions composed of twenty-five specialists in all branches of railway engineering, visited Japan early last year, spending over six weeks in the country inspecting the principal government railway repair shops. This mission was headed by Mr. Joukoff, Chairman of the Board of Directors of the Moscow-Kazan Railway and included Mr. Denisoff, now assistant manager of the Chinese Eastern Railway and Mr. Izmailoff, one of the directors of the same line. This inspection convinced the Soviet experts that the methods employed in the Japanese railway shops were the most efficient in the world and resulted in a formal diplomatic proposal inviting the Japanese Government to send a technical mission to teach the Soviet railway engineers how to manage their shops. After some months delay, the invitation was officially accepted and approved by the Japanese cabinet and the personnel of the mission carefully selected, by the Railway Ministry. The twelve experts will remain in Russia for eighteen months and will receive an average monthly compensation of Yen 950. The mission is composed of the following experts:

Mr. Chuji Kato, and Mr. Kurazo Baba, both engineers of Tokyo Railway Bureau; Mr. Kunichika Okawa, engineer, of Hamamatsu Works of the Nagoya Railway Bureau; Mr. Sadami Ishiguro, engineer, Kokura Works of Moji Railway Bureau; Mr. Kikumatsu Kimura, mechanic of Takatori Works of the Osaka Railway Bureau.

Mr. Moto-o Suyama, traffic expert of Hakodate office of Sapporo Railway Bureau; Mr. Eijiro Kakimoto, mechanic of Kokura Works of Moji Railway Bureau; Mr. Kotaro Shimizu, and Mr. Shinzo Inoue, both mechanics of Omiya Works of Tokyo Railway Bureau; Mr. Tsuneo Horiuchi, mechanic of Nagano Works of Nagoya Railway Bureau; Mr. Yoshizo Onari, mechanic of Omiya Works of Tokyo Railway Bureau; Mr. Masashi Hiroshima, clerk in the Foreign Section of the Traffic Bureau of Railway Office.

The dispatch of this mission to Russia is to be complemented by sending sixteen Russian railway engineers from the Moscow-Kazan Railway to be trained in the Omiya Shops of the Japanese Government Railways. These men will remain in Japan for four months to study and observe the Japanese system at close range when they will return to Moscow to assist the Japanese experts in reorganizing the Russian shops. Although final approval for this part of the program is being withheld by the Japanese authorities, there is reason to believe that consent will be forthcoming.

The Japanese mission will confine its work to a thorough reorganization of the Moscow-Kazan Railway Shops, the most important in Russia. These shops are equipped with the most modern appliances and only lack proper technical supervision to increase their efficiency. One of the Russian railway engineers attached to the Joukoff Mission, stated that the adoption of the Japanese methods in the Russian shops would equal the cost of 4,000 locomotives or a saving of Yen 400,000,000. The total expenses of the Japanese engineering mission will not exceed $100,000 gold. By coming to Japan, Russia has secured a cheap bargain in technical advice. It is interesting to note that while China is turning to America and Europe for expert technical assistance in the rehabilitation of her railway system (in which conditions closely resemble those in Russia) the Soviet authorities, placing economy and results above international politics, have sought the co-operation of Japan. The effect of this move on the railway development of Asia may have far-reaching consequences if the Japanese capitalize and take advantage of an opportunity that would be hailed by the American or British press as a great national achievement.

American and European rolling stock and railway equipment manufacturers have been keenly interested in Russia's railway rehabilitation and construction program, looking forward with anticipation to the time when a revival of railway building in that country will create an immense market for their products. Many missions of foreign experts have studied the transportation problems of Russia and drawn up plans for the purchase of new rolling stock and shop equipment, confidently expecting large orders to the manufacturers of their respective countries. Into this picture steps the Japanese engineering experts and, although their country may not at the moment loom large as a serious competitor for the requirements of the Russian railways, their ultimate success in this market is largely a matter of how far their banks are willing to extend the same credits as European and American manufacturers. Japan has closed her home market to foreign manufacturers or railway equipment. Only one per cent. of her railway purchases for 1928 was placed abroad. The Japanese manufacturers of railway rolling stock have a production capacity of three times the home demand. The Japanese Government Steel Works, now operating as efficiently as any of the best German mills, is branching out, seeking foreign orders for rails and bridge material. The Japanese newspapers report that the order for the big twelve span bridge over the Sungari River for the Chinese Eastern Railway, will go to the Kawasaki Dockyard. If true, this report indicates that the attitude of the Russian engineers who came to Japan last year (two of which are now directing the affairs of the Chinese Eastern Railway) is swinging favorably towards Japanese material and methods of construction.

At a banquet given by the Soviet Ambassador to Mr. Y. Egi, Japan's Minister of Railways on the departure of the Japanese mission to Russia, Mr. Troinovsky outlined the remarkable industrial development of Japan within the last two decades and stressed the corresponding growth of technical efficiency. The invitation extended by his Government to send Japanese engineers to instruct them in railway repair work testified to the high valuation placed by the Soviet experts on the technical achievements of Japan. "Soviet Russia," he said, "was aiming to introduce the best technical and engineering methods of other nations in the rehabilitation of its industries" and expressed the hope that that the Japanese railway mission to the U.S.S.R. would serve to promote and develop Soviet-Japanese friendship and pave the way towards closer trade relations.

Minister Egi, replying to Ambassador Troinovsky, reminded his audience that although it was taken for granted that Commodore Perry opened Japan to foreign intercourse, in reality, this honor should go to Admiral Putiatin, the commander of a Russian squadron who was the first to awaken Japan from her sleep of centuries. "After we have been for seventy years adapting ourselves to European culture, Russia is the first country to recognize our cultural achievements," said Minister Egi.

Soviet-Japanese Trade Increase

So much attention has been concentrated this past year on the political affairs of Soviet Russia, the Chinese Eastern Railway incident and the activities of the so-called Reds in Japan, that the rapid advance of economic relations between the Soviet and Japan has been overlooked. The following figures show that in four years of harmonious diplomatic relations, the trade between the two countries has made remarkable progress:

(In thousands yen)

	1925-26	*1926-27*	*1927-28*	*1928-29*
Export from U.S.S.R. into Japan ...	10,278	12,681	19,595	21,764
Import from Japan into U.S.S.R. ...	2,883	5,899	10,143	15,123
General turnover	13,161	18,581	29,738	36,887

The volume of trade has increased almost three times, while the export of Japanese goods to Russia has increased five fold. The significance of the Japanese engineering mission to Moscow will be better understood by the following brief résumé of trade relations between Japan and Russia outlined in a recent address of Mr. Tretiakoff, the Trade Representative of the U.S.S.R. in Japan.

> "The economic connections between U.S.S.R. and Japan are not limited by the foreign trade turnover. They are much wider, deeper and more variegated. Beside the trade turnover, U.S.S.R. and Japan are tied by concession work, by fishing convention and by transport service. To acknowledge this—it will be sufficient to mention such Japanese concessions as the oil concession and the coal concession in the Northern Saghalien. The production of the oil concession in the last year reached 175 thousand tons, making 75 per cent. of the entire oil production in Japan.
>
> The importance of the conventional waters is also noteworthy. The annual average value of fish production brought by Japanese fishermen home from these waters, is determined by the Japanese themselves at 50-60 million yen.
>
> More than 25 thousand Japanese fishermen work in the fisheries situated in these waters, 20—25 per cent. of them—in the Soviet fisheries.
>
> The same Okhotsk-Kamchatsk waters require a large transport service almost fully carried on by Japanese steamship companies. And Japanese tonnage serves also to carry Soviet and Japanese goods.
>
> The annual amount paid by U.S.S.R. for the Okhotsk-Kamchatsk transport services reaches the sum of 4—4.5 million yen.
>
> Such are economical connections uniting the interests of both neighboring countries. If all above enumerated elements of economical contact of U.S.S.R. and Japan be taken into consideration, the general turnover will be determined at the amount not less than 100 million yen.
>
> Special attention must be drawn to the growth of Japanese exports into U.S.S.R., or U.S.S.R. import from Japan, as it is extremely speedy due to increased requirements of the developing economy of U.S.S.R., and of the Far East in particular. It is to be noted, that several kinds of goods imported into U.S.S.R. from Japan, have found already a steady market in U.S.S.R, and some of these goods occupy an important place among other items of the Japanese export.
>
> The five year plan of industrialization of the country now carried on in U.S.S.R. displays vast new perspectives for import of Japan production into U.S.S.R. The program scheduled for the enlargement of Soviet shipbuilding also opens opportunities for Japan in the line of this business.
>
> The representatives of Soviet organizations who visited Japan last year had many times the opportunity to be convinced with their own eyes of the large potential possibilities of the Japanese market, not to say of the already acknowledged items of import. The railway delegation and the world engineering congress delegation after their visit to Japan, left it with a formed opinion, that the export market of Japan can be used just for importing into U.S.S.R. the above mentioned machinery and electrical apparatus in particular. The same point of view was assumed by the Soviet shipbuilding exports who believed that the shipbuilding of Japan could at a sufficient scale help the need of U.S.S.R.
>
> A large hindrance and obstacle, however, in this matter are the terms of payment offered by Japanese firms, which prove unsatisfactory for the Soviet organizations. The problem of credit is the most urgent one.
>
> For instance, the terms of payment under orders of Soviet economical organizations in Chechoslovakia are most favorable, the credit there being from 6 to 36 months long. Germany grants also a credit of up to 36 months; France up to 12 months; U.S.A. up to 24 months, etc., and only in Japan the maximum term of credit has been up to the present time—6 months.
>
> Such state of things, naturally, does not make the placing of orders in Japan advantageous, and stimulates the placing of them in those countries, where these terms are more profitable, while the quality, the price and other conditions in respect of these goods are similar to the production of Japan.
>
> We should think that the settlement of this question is one of the most substantial and pressing tasks of the present time, and unless the Japanese exporters make a decided move in order to facilitate as much as possible to the terms of credit for U.S.S.R., to make them adequate to those obtained in other countries, the Japanese export into U.S.S.R. will be considerably hindered in its development and can not reach its normal height.

The above authoritative statement tells us in clear enough words, that the Soviet authorities are convinced that Japanese railway equipment, marine engines, electrical and other industrial machinery and machine tools are quite good enough for their requirements and should Japan follow the precedent created by several prominent American manufacturers in opening a sufficient long time credit for the purchase of these materials, she will get the cream of the Soviet engineering business in Siberia and North Manchuria where her geographical position gives her a natural advantage.

A typical American contract, involving long time credit, is that arranged by the Austin Company, Automobile manufacturers of Cleveland, Ohio. Their contract is described in "Export Trade and Finance," as follows:

The contract calls for a plant capable eventually of turning out 500,000 Ford automobiles annually on a basis of two seven-hour working shifts daily, and for a city to house some 50,000 persons. The Austin Company on completion of the plant is to be responsible for its ability to maintain capacity production.

The scheduled date of completion is August 1, 1931—15 months after the beginning of actual construction in May, 1930. Between now and the latter date the detailed plans will be worked out here in Cleveland.

The estimated cost of the project is between $40,000,000 and $50,000,000. The project is one unit of the "five-year program" of the U. S. S. R., which is now in its second year. Under the program, Soviet officials purpose to spend as much as $30,000,000,000 to put Russian industry on the plane of the most modern industries in the United States. Their ambition is to convert Russia from an almost purely agrarian country to an industrial power.

According to W. J. Austin, president of the Austin Company, this is being undertaken, not so much as to enable Russia to compete with other nations in foreign markets, as for domestic reasons. The Russian leaders, he says, are convinced that the secret of American prosperity lies in the economics of efficient mass production. They wish to adopt American methods of mass production in order to increase the purchasing power of the industrial workers in their cities and to lower the cost of manufactured articles to the peasants, who have not been wholly sympathetic with Bolshevik ideals.

Autostroy, under the contract, has the right during the construction of the plant and city at Nijni Novgorod to send engineers to the Austin Company in the United States to study the company's methods of operation here. According to George A. Bryant, about ten Russian technical men will be here at all times until the completion of the project. The Austin Company plans to have between 20 and 30 of its engineers on the ground in Russia during that period. Russian labor will be used exclusively on the actual construction, and the function of the Austin Company's experts at the scene of construction will be purely advisory and supervisory.

The Austin Company will receive its compensation monthly in gold from the Amtorg Trading Corporation in New York. The contract covers the following items: Grading and filling the site, drainage and canals, sewage system for both factory and residences, water supply, steam plants for the factory and for residential heating, roads and pavements, railroads and sidings and lighting. Design of buildings for assembly shop, forge shop, body shop, sheet metal stamping shop, wheel and rim shop, radiator shop, spring shop, lumber storage and dry kilns, laboratories, materials storage, service department, club house, theatre, library, laundry, kitchens, athletic field, stadium, hospital, cafeteria, offices, schools, stores and residences. Design and complete lay-out of equipment for gray iron, malleable iron, brass and aluminum foundries, proving grounds and track, ventilating, heating, plumbing, sprinkler system, fire department, compressed air plant, transformer house, acetylene plant and fuel oil system.

The plant will undoubtedly be more complete than any American automobile plant, for virtually every manufacturer here buys some parts. The Russians will manufacture at Nijni Novgorod every part that goes on the assembly line, from bolts and nuts to springs, axles and motors.

The German Industrial Commission

Among the numerous Commissions which have come to China during the past two years in search of trade not the least interesting will be the German Industrial Commission, consisting of merchants, bankers and engineers. This Commission is now in Canton; it will shortly visit Shanghai and Nanking, and will pass on to North China and thence to Manchuria, and home via Siberia. It is a Commission of study, and much is to be expected from its reports.

German business in China is recovering with remarkable rapidity, particularly in engineering lines. It is too early to assume that this business can reach pre-war conditions because of the larger number of nationalities competing in this field, but the presence of so many German and Austrian advisers in Government offices in Nanking and the provinces is undoubtedly giving the Germans a grip which they will undoubtedly exploit to their advantage. The fact remains that the Germans are coming back, and coming back very aggressively, in the Far Eastern market, and that a decade after the War the Germans are an economic power in Asia that has to be considered seriously in any survey of the general situation. That Germany should have accomplished so much in so short a time after suffering such a terrific shock speaks volumes for a sober, hard-working, rational nation, which, having a problem to face, applies itself to it with energy and force and a sense of the fitness of things. The Germans work hard in China, they cut their overhead, their meet changing conditions. Because of this, the disadvantages of reparations, etc. do not affect their prices or their credits.

The following are the members of the Commission:—

Mr. Retzmann, member of the Reichsverband der Deutschen Industrie (head of German Industrial Organisations).

Mr. Wendt, Director, representative of the Iron Industry.

Mr. Rademacher, expert in Railways and Engineering.

Mr. Dettmer, Professor of the Technical University, Hannover, expert in Electricity.

Mr. von Gontard, representative of the Machine Industry,

Messrs. Jacoby and Schippel, Financial experts.

Improved Shipping on the Pacific

This issue of the *Far Eastern Review* is largely devoted to the new shipping on the Pacific. We hope in future issues to give space to special articles with regard to shipping in China and other Far Eastern countries, the developments of the navies of these countries, and the work of the shipbuilding yards and drydocks, which is constantly increasing and becoming more efficient In this manner, in the course of the next few months the *Far Eastern Review* will contain a full record of shipping and shipbuilding activity in the Far East.

It is most gratfying to those who live in the Far East to realize that the shipping companies are vying with each other to provide ships and services equal to the best that is found on the Atlantic. It represents not merely a keener interest in Far Eastern business, but the prospects of greater profits arising from the development of Far Eastern markets and the tourist trade in Far Eastern countries. The N.Y.K., the Canadian Pacific and the Dollar Company are all improving their lines, building larger and better steamers, modernizing their equipment and meeting the most exacting requirements of modern travellers. This is also true of the European lines going out to India and Hongkong. It will mean that eventually the distances between China, Japan and the Straits and the United States, Canada and Europe will be shortened by more rapid transportation. It means that holiday traffic will increase. It means a greater interchange of perishable goods.

Finally, one comes to the political aspects of the situation. Far Eastern peoples are assumed to be so wholly different from Westerners because the rest of the world does not know them, and therefore bases its opinions on curious assumptions. When one thinks of Asiatics, one seldom thinks of Turks or Persians, because they are closer to Europe, and often are accepted as Europeans. Yet the people of Asia are not different from Europeans in so many respects as is generally imagined. Closer contact, a better understanding, a keener relationship wipes out these differences and makes for a greater world harmony. This, in the last analysis, is what the improved shipping on the Pacific will accomplish.

The New Sino-Japanese Tariff Treaty

(Continued from page 101).

of Dairen, the export tariff of the Three Eastern Provinces continues to be collected in accordance with the old rates, and Japan continues to insist upon the special land frontier rates of duty, which are 33½ per cent. lower than the Maritime Customs tariff.

The conclusion of the present agreement marks the definite recognition by Japan of China's complete tariff autonomy, and will also terminate the unsatisfactory situation that obtains with regard to the Three Eastern Provinces. It will further mean the relinquishment of the special land frontier duty rates, which Japan alone is enjoying on the frontier.

As a temporary measure of transition, the agreement is accompanied by an arrangement of limited scope, and for a limited period, providing that on a few articles of Chinese export Japan agrees to reduce the duties somewhat; while for certain articles of import, during a short period, China agrees to maintain the present rates or not to increase them beyond a certain point.

It is emphasized that the transitory arrangement covers a limited number of articles, and only for a limited period, which will be seen when the whole agreement is published. This temporary measure is considered the only practicable means of regularizing Sino-Japanese relations on the basis of China's complete tariff autonomy, and it does not mark any departure from the general policy of not negotiating agreements embodying mutual tariff concessions.

One of the salient factors in making this negotiation a success was the increased good-will and frankness among the negotiators and the greater confidence in those in control of either government. Whether the result is to be explained psychologically or politically from the standpoint of different times creating different conditions, the fact remains that it seemed to be easier for Mr. Soong, Dr. Wang and Mr. Shigemitsu to find a basis for agreement than has been possible during the past two years. Perhaps this same atmosphere will make it possible for the two countries to settle all the outstanding impediments to the most friendly relations between them.

Banner Year for N.Y.K.

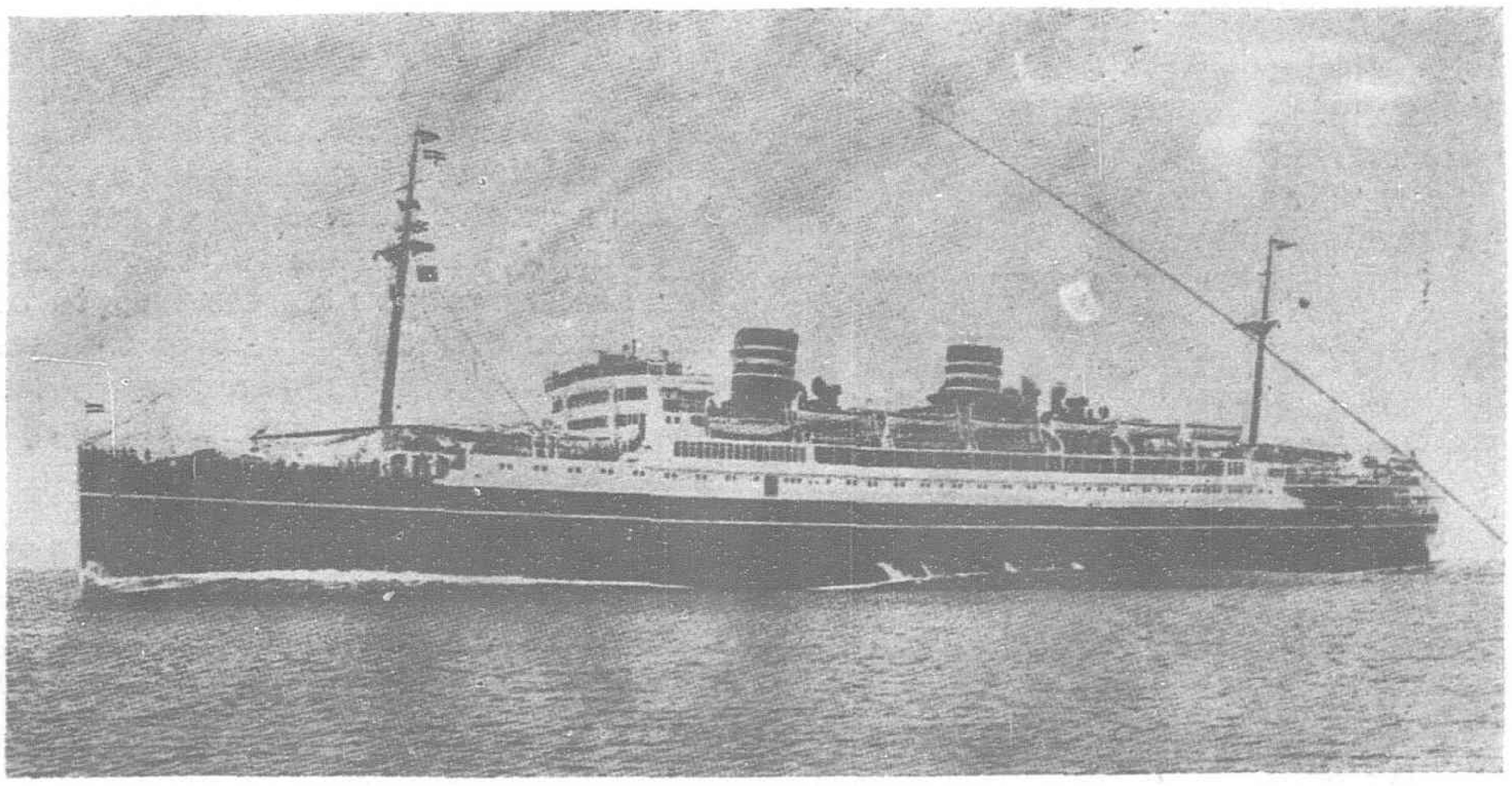
Y.80,000,000 Project for Building Nine 10,000 Ton Class Motorships Nearing Completion

By EISABURO KUSANO

Nineteen hundred and thirty is a banner year for the Nippon Yusen Kaisha. Its Y.80,000,000 project for building nine 10,000 ton class diesel-engined ships is nearing completion, and almost 120,000 tons in new motor-liners will be added to its already gigantic fleet. Of these nine, two of 11,800 tons gross each will be placed on the Japan-London Service, and the others will be operated on the trans-Pacific, three 17,000 tonners on the California-Orient Line, another trio of 11,600 tons each on the Seattle Line, and the remaining one vessel of 9,700 tons on the South American (west coast) Line.

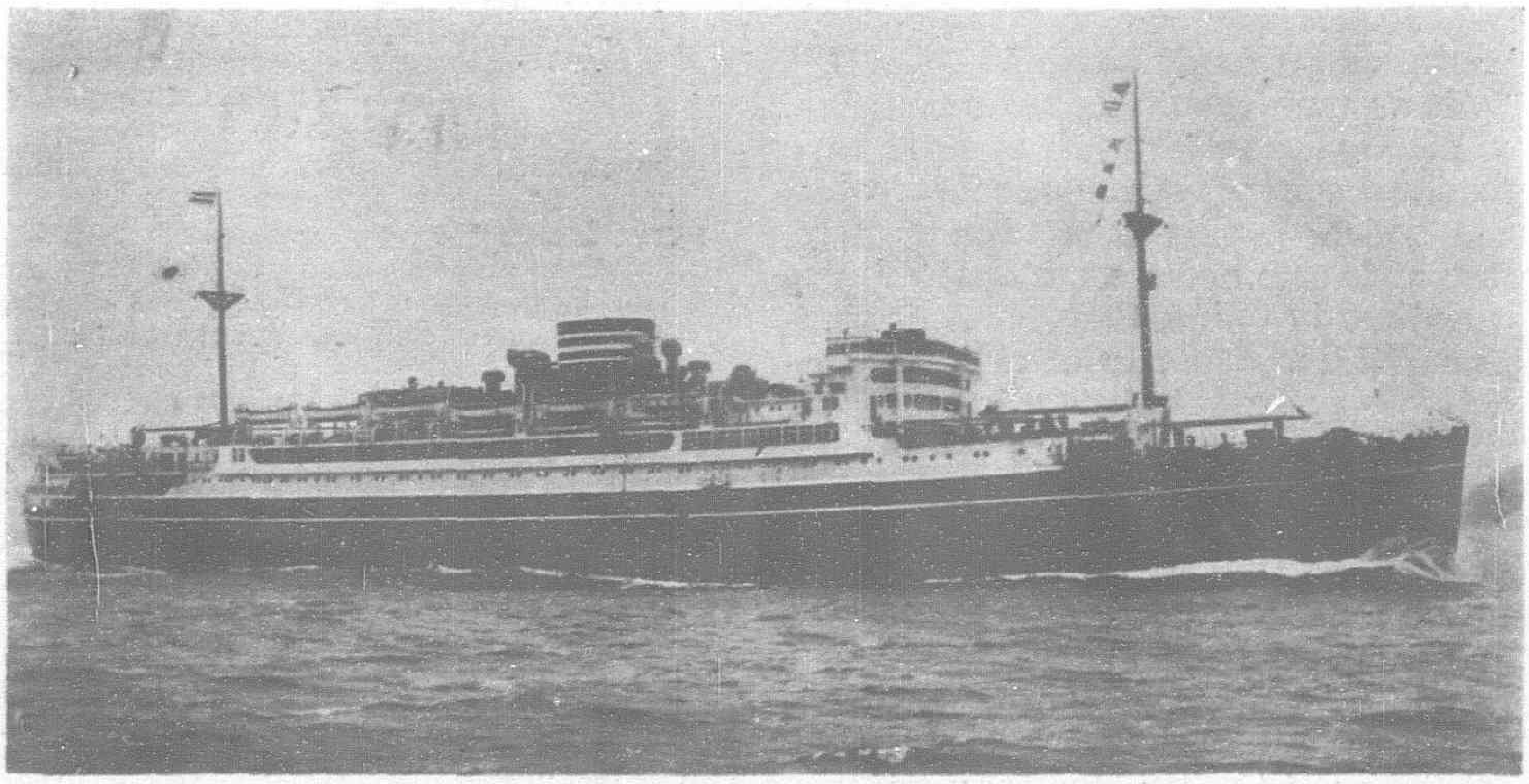
Particularly significant is the N.Y.K.'s present building project, in view of the fact that the center of activities of the world shipping is gradually shifting from the Atlantic to the Pacific, especially in recent years.

For generations past, the Atlantic Ocean has been the arena of keen rivalry among the European and American shipping concerns, but now that nothing more remains to be done there, their attention has naturally turned to the vast possibilities of the Pacific. Some of them are thus contemplating the improvement of their lines already established in the Orient, while others plan to force their way in by opening new lines with excellent vessels of high efficiency.



The "Asama Maru"

Among others, the Dollar Line is reported to have decided to build six 20,000 tonners with a speed of more than 20 knots to improve its round-the-world service, the Canadian Pacific Railway & Steamship Company announces that it is ready to place the *Empress of Japan*, the " new Queen of its Pacific fleet " which is a 25,000 ton geared turbine engined ship, on its trans-Pacific service in the immediate future, while the Klaveness Line of Norway is said to be planning to wedge into the cargo trade of the Pacific with a fleet of six motorships. Moreover, the Silver Line and the Prince Line, as well as the Dollar Line, are also said to be preparing to expand their service between the eastern coast ports of North America and the Orient *via* Panama with new motorships. The Barber Line is also reported to be preparing to open a new line connecting New York and Shanghai *via* Panama with a fleet of five motorships.



The "Chichibu Maru"

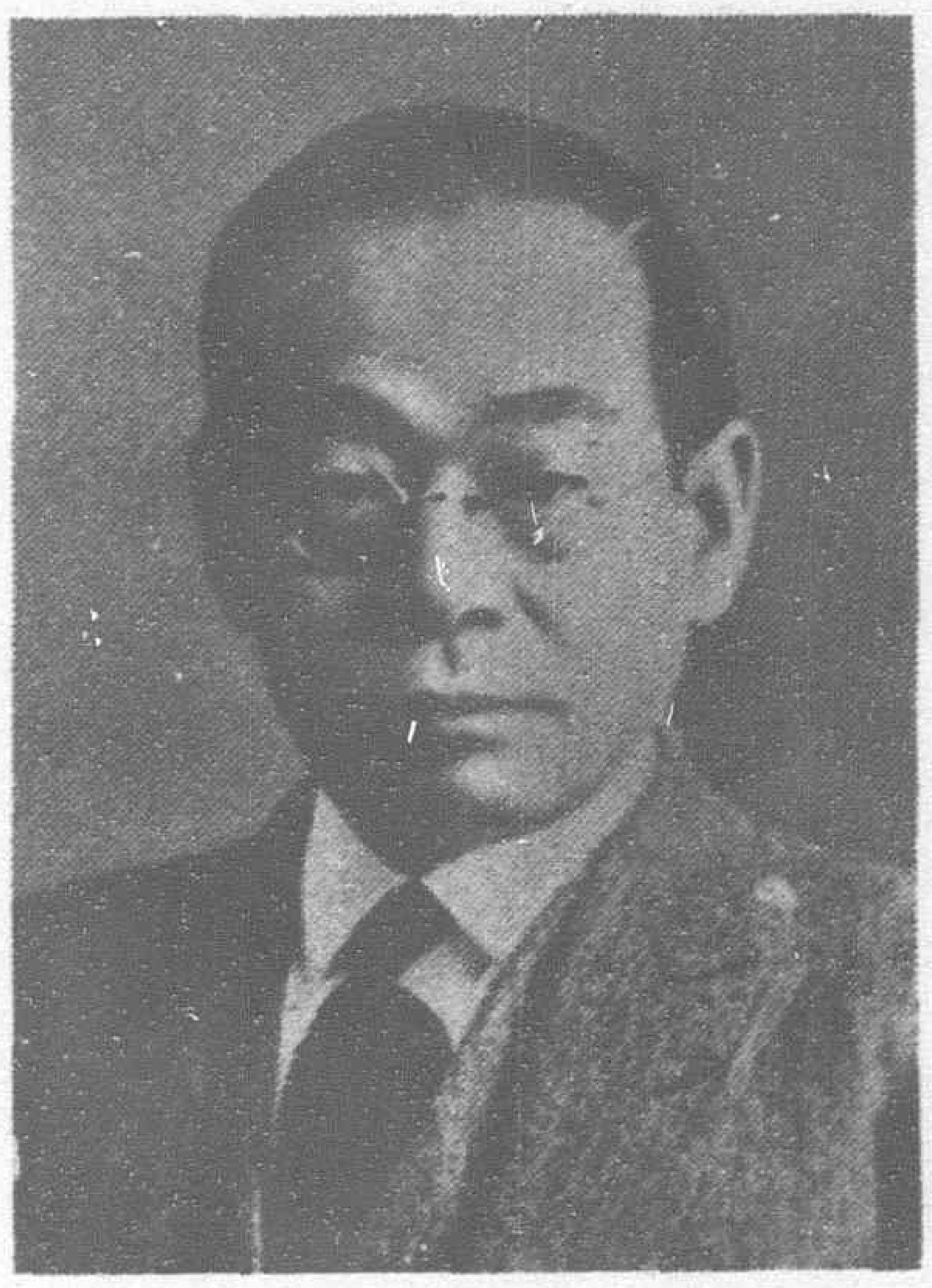
The much-talked-about " Pacific Era" of the world shipping now looms. And, what Japan has been doing all this time to cope with the situation? She has just passed another year of depression and that of suffering from the " cancer " of old ships. Nevertheless, the Japanese shipowners are not wringing their hands in idle lament.

When the European shipping companies in grim earnest began in 1921 to build new ships of superb pattern, even at such a heavy sacrifice as selling old ships at prices which corresponded only to about one-fifth of the cost of construction of one new vessel, to be prepared for the keener post-war competition that eventually set in the Atlantic, alas! the Japanese shipping companies were not willing to do likewise ; instead, they purchased a huge volume of these old ships that were driven out of the Atlantic market. Taking advantage of the very low cost of these second-hand ships, they somehow managed to pull through a prolonged period of the world-wide post-war depression, only to realize lately that after all it was not a wise policy. Their need of new, fast, and economical ships was further augmented by the fever of building diesel-engined ships that has swept all over the world.

Once the disadvantage of operating old steamers in competition with new motorships was fully realized, such enterprising concerns as the Mitsui Bussan K.K., the Mitsubishi Shoji K.K., the Itaya Kisen K.K. (the Itaya Steamship Co.), the Shimaya Kisen K.K. (the Shimaya Steamship Co.), the Yamamoto Shoji K.K. (the Yamamoto Commercial Co.), the Showa Shosen K.K. (the Showa Merchant Ship Co.), and some others who had ability to pay, did not hesitate to build and operate smart diesel-engined ships on their respective lines. These companies alone constructed more than 150,000 tons of motorships. Later, the Yamashita Kisen K.K., and the Toyo Kisen K.K. followed the example while the Kokusai Kisen K.K. has just drafted a plan of building two 9,300 ton diesel-engined ships as the preliminary step toward rebuilding its fleet. The Kishimoto Kisen K.K. is now building two motorships to be chartered by the O.S.K. for a long period, while the Chosen Yusen K.K. also plans to build a motorship. On the top of all, the Shipping Department of the Mitsui Bussan K.K. has just drafted a gigantic plan of constructing 380,000 tons of motorships in the course of coming 25 years, beginning this year.

But these companies were not the only shipping concerns in Japan that were

Mr. Y. Takeda, Managing Director



Mr. K. Kagami, President of the N.Y.K.

Mr. N. Ohtani, Managing Director

particularly impressed by the superiority of motorships and also by the need of possessing them, for there are other still minor firms that contemplate the project of operating motorships, and then, there is such an influential company as the Osaka Shosen Kaisha, familiarly known as the O.S.K., which is now steadily realizing its program of building 10 motorships to improve its Australian, New York and South American lines. In fact, three of these ten motorships have been completed and they are now being operated with great success, these liners being the *Ural Maru*, 6,300 tons, the *Buenos Aires Maru*, 9,600 tons, and the *Sydney Maru*, 5,400 tons.

Furthermore, the list of second-hand ships imported into Japan during the past few years included none of very old vessels, except some which were imported exclusively for the purpose of being scrapped. Japan's merchant marine, therefore, has thus witnessed a substantial improvement in recent years, and added to this is the N.Y.K.'s remarkable contribution.

N.Y.K.'s Building Project

The building project of the Nippon Yusen Kaisha Line by far exceed that of other shipping companies in this country in point of scale as well as quality. Especially, the three luxurious passenger-carrying motor-liners of 17,000 tons each for the California-Orient Service are the last word in the art of shipbuilding, and they are indeed the pride of Japan. These three, which are rightly referred to as " superb trio " by the N.Y.K. authorities are the *Asama Maru*, the *Tatusuta Maru*, and the *Chichibu Maru*.

The *Asama Maru*, the first ship of the " superb trio " was built and launched in October, 1928, and was fitted out in September, of the following year, at the Nagasaki yards of the Mitsubishi Shipbuilding Company, to start on her long awaited service on the San Francisco line in October, 1929. Perfect is an adjective which does not seem to be strong enough to describe the popularity and enthusiastic admiration that were won by the service of this Sulzer diesel-engined liner on her maiden trip ; all the passengers were more than pleased with the courteous service, comfortable accommodation, and the pleasant speed. In fact, this largest motorship that was ever built in Japan, covered the whole distance between Yokohama and San Francisco in 12 days, not counting one day's stop at Hawaii, in her maiden voyage. It signifies a reduction of four days in the number of days that was hitherto required by other N.Y.K. liners on this run. This fine record made possible by the *Asama Maru* is being maintained to this day, and it is expected that it would become a standard schedule of the N.Y.K. liners on this line with the completion of her two sister ships, the *Tatsuta Maru*, and the *Chichibu Maru*.

Captain Shinomiya of the "Asama Maru"

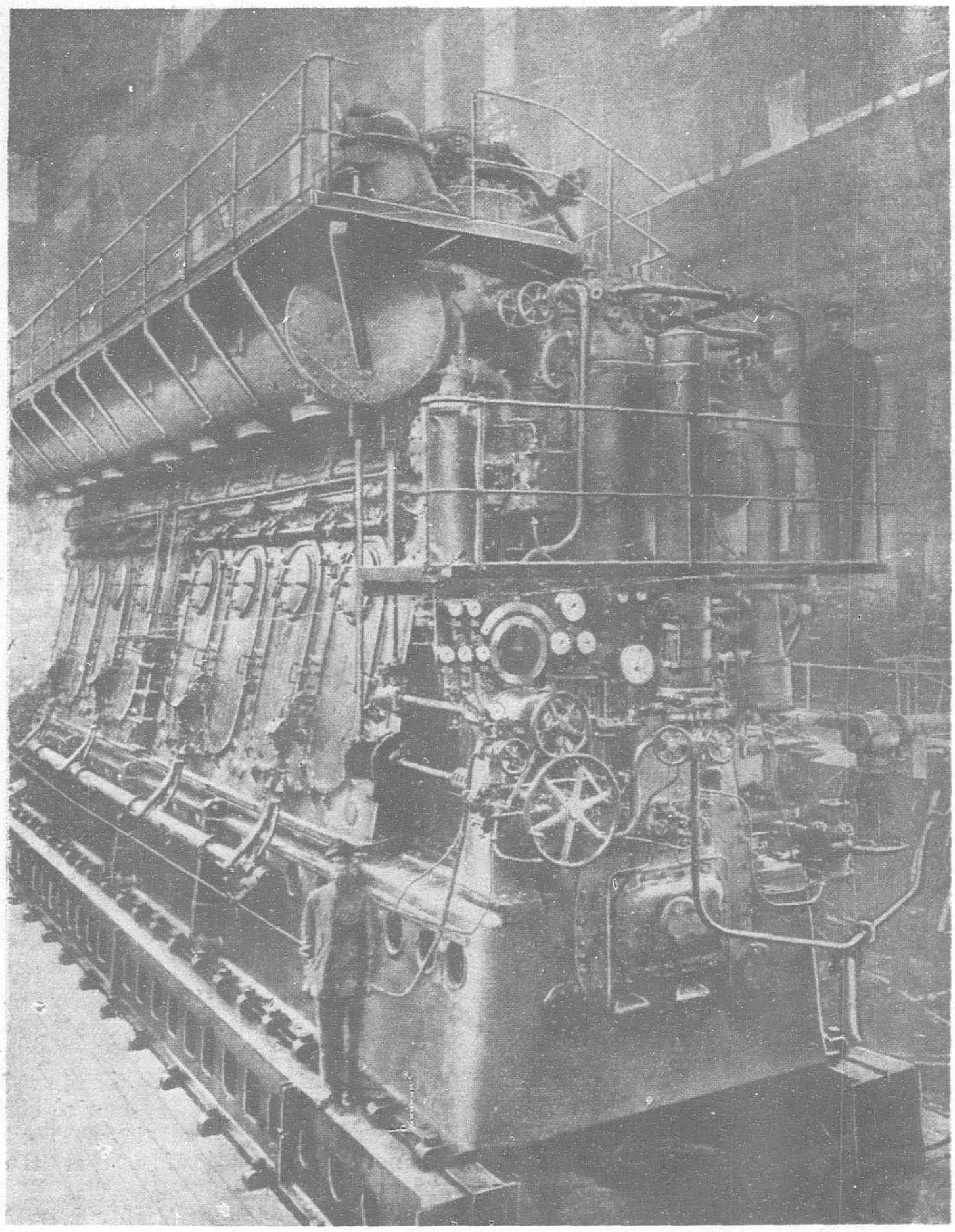
The *Tatsuta Maru* is a sister ship of the *Asama Maru*, equipped with Sulzer diesel engines. She was built and launched at the Nagasaki yards of the Mitsubishi Shipbuilding Company in April, 1929, is now being fitted out at the same yards. The *Chichibu Maru* is a Burmeister diesel-engined 17,000 tonner, built and launched at the Yokohama works of the Yokohama Dockyard Company also in April, 1929, and is now being equipped there. Both of them are to be placed on the San Francisco service simultaneously in April, this year, the *Chichibu Maru* going to San Francisco first while the *Tatsuta Maru* is making a visit to Hongkong.

Primarily, the " superb trio" were designed to maintain average sea speed of 17 knots, but their service speed will be elevated to 18½ or 19 knots. As a matter of fact, the *Chichibu Maru*, at one of her official trial runs, developed 21½ knots which was one quarter of a nautical mile higher than the record registered by the *Asama Maru*, while the *Tatsuta Maru*, at one of her official trial runs developed a maximum speed of 21.232 knots despite the fact that the weather was unfavorable.

Closely following the inauguration of service by these ultra-modern motorships, another trio of 11,600 tons each will be plying on the Seattle line. They are the *Hikawa Maru*, the *Hiye Maru* and the *Heian Maru*, all of which are equipped with Burmeister diesel-engines. The *Hikawa Maru* and the *Hiye Maru* were built and launched at the Yokohama Dockyard Company in September, 1929, and February, 1930, respectively, and they are now being fitted out to start on their respective maiden trips across the Pacific to Seattle in May, and in August, this year. The *Heian Maru* is now being built at the Sakurajima works of the Osaka Iron Works in Osaka. She will be launched during April, this year, to start her service in December, this year.

Meanwhile, the *Heiyo Maru*, another Sulzer desel-engined ship of 9,700 tons gross, the smallest ship of the present building program of the N.Y.K. was built and launched at the Sakurajima yard of the Osaka Iron Works in October, 1929, and is now being equipped to begin her service on the South American west coast line in April, this year. This is the first deep-sea going diesel-engined ship that was ever launched into a river in Japan, and the largest ship that was launched in Osaka. The success of this memorable event has encouraged the Osaka Iron Works authorities so much that they were convinced of launching any 10,000 ton class ships at their Sakurajima yard.

All of these four trans-Pacific liners have struck out new lines in their respective designs, and the N.Y.K. authorities are firmly convinced that they would also win popularity and admiration upon their commencement of service. Particularly noteworthy about the innovation of these liners is that the *Hikawa Maru*, the *Hiye*



4,000 b.h.p. Sulzer Engine for N.Y.K. Liner

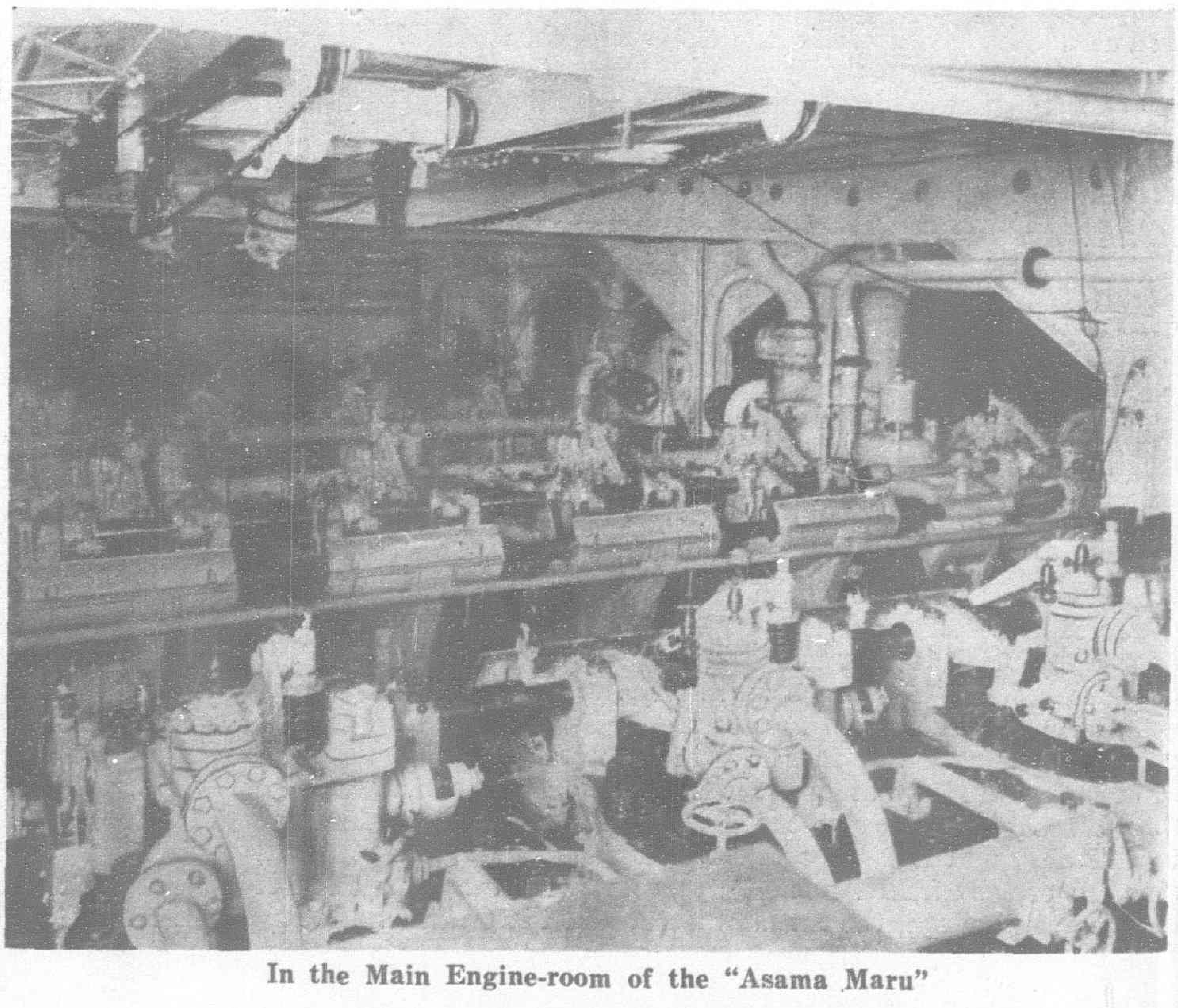
Maru, and the *Heian Maru* are the first "cabin ships" to be introduced in the Pacific. The salient feature of the cabin ships in that the passengers are given accommodation which is similar to that of the first class of regular passenger boat at a fare almost the same as that of the second class. Moreover, these motor-liners, apart from the regular third class, have the tourist class which is known as the most economical and practical in accommodation. The N.Y.K. authorities have introduced these two classes of practical system on the three new Seattle liners in view of the fact that, though the San Francisco line is the main highway of passenger service across the Pacific Ocean, the Seattle line is not quite the same, and that by introduction of these classes, they were desirous of soliciting the patronage of new classes of passengers, who, although do not care for luxury, would travel aboard ships that had practical and pleasant accommodation.

Two more ships of passenger-cargo combination are now being fitted out at the Nagasaki yards of the Mitsubishi Shipbuilding Company for the N.Y.K. They are the *Terukuni Maru* and the *Yasukuni Maru*, Sulzer diesel engined sister ships of 11,800 tons each. The *Terukuni Maru* was launched in December, 1929, and the *Yasukuni Maru*, in February, 1930, and they are to start on their main trip to London, leaving Kobe on July 4 and September 26, this year, respectively.

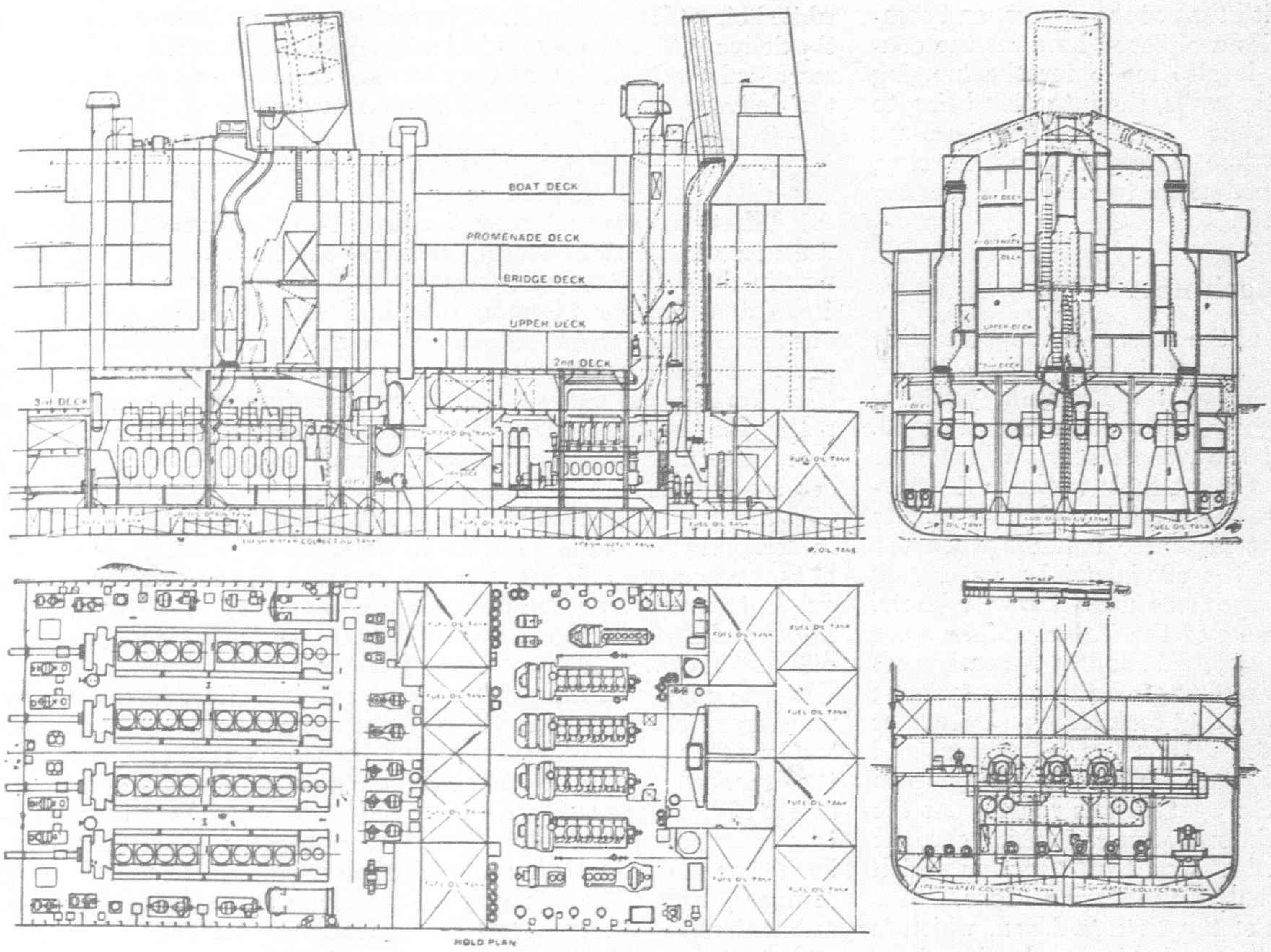
The N.Y.K.'s European liners have hitherto required 39 days to complete the journey between Kobe and Marseilles, but with the placing of these two motorships on the London line, the trip is going to be cut down by five days to 34 days. Moreover, the company has hitherto operated eleven ships on the European line, but the number of ships is also going to be reduced to ten, with the commencement of service by the *Terukuni Maru* and the *Yasukuni Maru*. The *Kitano Maru*, the *Kamo Maru*, and the *Atsuta Maru* of the present eleven on the European Line are to be transferred to the Australian run, while the remaining eight ships, including the *Hakone Maru*, the *Hakozaki Maru*, the *Haruna Maru*, the *Hakusan Maru*, the *Kashima Maru*, the *Katori Maru*, the *Fushimi Maru*, and the *Suwa Maru* are to increase their service speed in order to keep pace with the *Terukuni Maru* and the *Yasukuni Maru*.

When the N.Y.K. authorities decided to build these nine 10,000 ton class motorships, no doubt due chiefly to stimulation given by the improvement of service of foreign shipping companies operating in the Orient, a budget of Y.80,000,000 was appropriated. It was estimated that the cost of construction of these liners may vary from Y.75,000,000 to Y.80,000,000. It was also decided then that debentures be issued to the amount of Y.60,000,000 and that the rest of the expenditures be covered by the reserves held by the company. The debentures were then issued in three lots; the first of the series was issued to the amount of Y.15,000,000, bearing 7 per cent. interest, but the second and the last of the series were issued to the amount of Y.15,000,000 and Y.30,000,000 respectively, bearing 5.5 per cent. interest. The latter lots of debentures were issued on favorable conditions for the company as the money market was easy then.

By way of showing, at a glance, the present building project of the N.Y.K., the names of ships, tonnage, builders, engines, the date of opening service and their respective lines will be given in the table to follow:



In the Main Engine-room of the "Asama Maru"



Engine-room Plans of the Quadruple Screw Liner "Asama Maru"

Names	*Tonnage (gross)*	*Builders*	*Engines*	*Open service*	*Lines*
Asama Maru ...	17,000	Nagasaki	Sulzer	Oct. 1929	S. Francisco
Tatsuta Maru ...	17,000	Nagasaki	Sulzer	Apr. 1930	S. Francisco
Chichibu Maru ...	17,300	Yokohama	Burmeister	Apr. 1930	S. Francisco
Hikawa Maru ...	11,600	Yokohama	Burmeister	May, 1930	Seattle
Hiye Maru ...	11,600	Yokohama	Burmeister	Aug. 1930	Seattle
Heian Maru ...	11,600	Sakurajima	Burmeister	Dec. 1930	Seattle
Heiyo Maru ...	9,700	Sakurajima	Sulzer	Apr. 1930	S. America
Terukuni Maru ...	11,800	Nagasaki	Sulzer	Jun. 1930	London
Yasukuni Maru ...	11,800	Nagasaki	Sulzer	Sept. 1930	London

NOTE: *In the names of the builders, Nagasaki stands for the Nagasaki yards of the Mitsubishi Shipbuilding Company, Yokohama, the Yokohama Dockyard Company, and Sakurajima, the Osaka Iron Works.*

As regards further particulars of these nine vessels, the reader is referred to the Table "A." Preliminary Particulars and the Table "B." Navigation Instruments, which are given elsewhere in the present article.

But there is one thing that must be added here, and that is that the N.Y.K. authorities, in their eagerness to improve the service and cuisine on board the three San Francisco liners, selected from among its most capable employees, three captains, three pursers, and three chief stewards and sent them abroad to study in America and Europe in hotels, as well as on foreign liners operated on the Atlantic and Pacific, in order to qualify themselves to discharge their duties with particular efficiency and stisfaction when they take, after their return, their respective posts on these new ships.

The *Tatsuta Maru* and *Asama Maru*

Ever since the *Asama Maru* scored a phenomenal success on her maiden voyage to San Francisco toward the close of last year, so much has been written in newspapers and other periodicals about this wonderful motorship that there is little to be added to these contributions. However, very little is so far known as regards her sister ships the *Tatsuta Maru* and the *Chichibu Maru*.

So far as the construction of hull and equipment are concerned, there is hardly any difference between the *Tatsuta Maru* and the *Asama Maru*. But a number of engineers of the Nagasaki yards of the Mitsubishi Shipbuilding Company who were in charge of the construction of the *Asama Maru* took part in her maiden trip to San Francisco in order to study the actual result of her navigation, and based on their experiences and discoveries that were made during this voyage, some improvements were effected upon the *Tatsuta Maru*, in the way of navigation appliances, mooring and cargo facilities, as well as the cuisine and decoration of cabins and public halls. Moreover, apart from these new improvements, there are some differences in the design of decorations of these two sister ships. For instance, the *Asama Maru's* coloring and decorations give an impression of aristocratic dignity while the mood of general decoration of the *Tatsuta Maru* stands for the French delicacy.

On board the *Asama Maru*, the dining saloon at the center of the "C" deck is finished after the fashion of the early Georgian period. Its walls are panelled with painted mahogany plywood and groups or single cylindrical columns of black marble finish, with ornate gilded capitals which give the room a magnificent appearance. On the walls of the well—opening to the upper ceiling, there are beautiful fresco paintings on lunette-shaped panels, two on each side, port and starboard. But on board the *Tatsuta Maru*, white fluted color is used instead of the striking contrast of black and gold of her sister ship, and then, instead of the paintings that decorate the walls of the *Asama Maru's* dining saloon, the *Tatsuta Maru* has plaster enrichment.

The lounge of the *Tatsuta Maru*, situated amidships on "A" deck, is also decorated according to the Georgian style, same as the *Asama Maru*. But the walls of this palatial room is painted in greenish pale blue whereas that of the *Asama Maru* is finished in ivory and cream color. Blue is prominent in the coloring of the curtain and chairs of the lounge of the *Asama Maru*, but orange is the key-color for the *Tatsuta Maru*. The floor of the room of both ships is inlaid with oak-wood block parquetry and covered with huge rugs, soft and colorful. By removing the rugs, it can instantly be converted into a perfectly-floored grand ball-room of 2,000 square feet wherein the passengers may enjoy dancing, to the accompaniment of the ship's orchestra. A regular stage with a lofty, semi-circular prosenium arch is at the fore end of the room of both the *Tatsuta Maru* and the *Asama Maru*, and grand piano, footlights, and other necessary paraphernalia for theatrical performances or concerts are provided. In addition, high above on the aft end wall a cinema projection room is fixed for the presentation of motion pictures. The center ceiling of the Lounge forms a Dome.

Above the mantelpiece of the lounge of the *Asama Maru*, there is a gorgeous figure brocade representing the scenery of the Asama Shrine near Mount Fuji after which the boat is named, while on board the *Tatsuta Maru*, there is a magnificent figure embroidery of the Tatsuta Shrine and the River Tatsuta, as the ship is named after this shrine.

The two suite-rooms of the *Asama Maru* were designed and decorated by the Kawashima Orimono-sho of Kyoto and the Takashimaya Department Store of Osaka, respectively, but both of the suite rooms aboard the *Tatsuta Maru* were designed and decorated by the Takashimaya Department Store of Osaka. The *Asama Maru's* regal suite room was decorated in the Indian fashion, but that of the *Tatsuta Maru* was finished in the Spanish manner. The painted-walls-usual-suite room of the *Asama Maru* was decorated in a quiet, traditional Japanese way, but the *Tatsuta Maru* adopted a decoration which is a kind of mixture of the Japanese and Chinese which might be called in a general term an Oriental taste.

Both the *Asama Maru* and the *Tatsuta Maru* have galleries, 60 feet long, on the port and starboard sides, constituting the passageway from the lounge to the smoking-room. Their decoration of the Georgian period is in uniform with that of the lounge, and comfortable settees, chairs, writing tables are placed here for the convenience of passengers. Provision is also made for the hanging of a large collection of pictures on the walls, the intention being to have these exhibits changed from time to time. Also, there are a swimming pool, adjoining gymnasium, a regular bank, nursery, and many other delightful accommodations to make the journey on these liners thoroughly enjoyable.

Propelling Machinery

The main propelling machinery of the *Tatsuta Maru*, consisting of four sets of eight-cylinder, single acting motors developing 16,000 h.p. theoretically, were entirely built at the Nagasaki yards of the Mitsubishi Shipbuilding Company with Japanese material. They are just the same as that of the *Asama Maru* which were built by Messrs. Sulzer Brothers & Co., at their works in Switzerland and were installed by the Mitsubishi experts. A high tribute was paid to the Swiss firm and the Japanese builders when the *Asama Maru* developed, at one of the official trial runs, 19,600 h.p. of power, attaining such high speed as more than 21 knots. But when a series of official trial runs of the *Tatsuta Maru* were conducted toward the end of December, 1929, and in the early part of January, this year, the results far exceeded the expectations; at the first trial run of the *Tatsuta Maru* that took place on December 27, 1929, for instance, she developed 20,663 h.p. of power, and attained 20.93 knots on the average, the high speed running up to 21.232 knots despite the fact that the weather was rough. At the fuel consumption measuring test held on January 9, this year, the consumption of fuel in gr./B.H.P./hr. was 169.63 grams which record was also much better than that of the *Asama Maru*.

All the results of various trials of the *Tatsuta Maru*, which is equipped with Japan-made propelling machinery, having thus proved to be even better than that of the *Asama Maru*, the inauguration of the service by this excellent motor-liner will mark a new epoch in the history of progress of the art of shipbuilding in Japan.

As regards other equipment of the navigation appliances of the *Tatsuta Maru*, they are just the same as that of the *Asama Maru*, both of them having a complete Sperry gyro compass equipment with an automatic steerer of the two unit type and a course recorder, a Kolster radio direction finder, a Sal Log speed and distance indicator, electric engine revolution indicators, an electric helm indicator, clear view screens of the latest type, and many other modern devices. An elaborate system of electric engine, docking, anchor and steering telegraphs of the alternating current type is also provided.

Inter-communication by means of a loud-speaking telephone system is provided between the wheel-house, the main and auxiliary engine rooms, the docking bridge, the steering engine room, the emergency dynamo room, the wireless office and several other positions. The electro-hydraulic steering gear, which has been manufactured by Messrs. Brown Brothers & Co. is of the latest 4-cylinder design, and is equipped with two complete power units, each unit being in itself sufficient to meet all normal steering requirements. Should occasion arise which demand especially rapid manoeuvring, both units may be operated simultaneously. The electric motors are controlled by automatic starters, and a special feature is that, emergency pushes are fitted in the wheel-house in addition to the regular control pushes in the engine room, so that, in a case of a sudden failure of the working unit in narrow waters, the reserve unit may be instantaneously brought into action by the officer on the watch.

It almost goes without saying that these liners are provided with a complete and efficient equipment of life-saving appliances, and this has been installed in accordance with the latest requirements of the Department of Communications of the Imperial Government of Japan, the United States Steamboat Inspection Service, and the British Board of Trade. Moreover, they comply with the rules recently laid down by the International Convention for the Safety of Life at Sea, 1929.

For dealing with outbreaks of fire in any of the cargo spaces, a fire-extinguishing and detecting plant on the Lux Rich system is installed, and the Derby automatic fire alarm system is installed to protect all public rooms, state-rooms, crew's quarters and stores.

The *Tatsuta Maru* will be delivered to the N.Y.K. Line on March 15, this year. It was feared, at one time, that the fire that broke out on "A" deck of the liner in the early part of February while being fitted out at the Nagasaki yards might cause a delay in the delivery, but the Mitsubishi authorities, on February 7, formally reassured the N.Y.K. that they would work day and night to make the delivery on the previously fixed date possible.

The *Chichibu Maru*

What attracts one's attention first of all, looking at the *Chichibu Maru*, another stately floating palace of the N.Y.K.'s "superb trio" now in the final stage of equipment at the Yokohama works of the Yokohama Dockyard Company, is that the 17,300 ton liner has only one funnel although her sister ships the *Asama Maru* and the *Tatsuta Maru* have two each. This difference comes from the fact that the *Chichibu Maru* is equipped with two sets of four cylinder, double-acting Burmeister & Wain diesel-engines, from that famous Danish firm, instead of the Sulzer diesel engines with which her sister ships are equipped.

One needs hardly mention the fact that care has been taken in designing general lay-out, particularly for the comfort and safety of the passengers, and that the interior finish will be completed in an exquisite manner as was the case with her sister ships the *Asama Maru* and *Tatsuta Maru*, but it is going to be done in somewhat different style.

One of the striking features of the *Chichibu Maru* is that a number of fire and water-tight doors are placed in all important sections throughout the ship, so that, in the event of an emergency, the damage and danger will be limited to a minimum and thus the safety of passengers aboard will be fully ensured. As to the navigators' equipment, entirely up-to-date apparatus of all kinds has been installed, including electrically operated telegraph, gyro compass, automatic steering gear, deep-sea sounding machine, radio direction finder, searchlight, clear view screen, range-finder, and draft measuring equipment.

The whole space of "A" deck is exclusively reserved for the public rooms, while "B" and "C" decks are occupied by first class state-rooms including the suite de luxe. There are two suite de luxe aboard the *Chichibu Maru*, same as her sister ships, and the decorations furnishing of these suites have been executed by the famous Marc Simmons of Paris. Most of the first class staterooms are outside rooms with windows or port-holes opening direct on the sea, and usually fitted with beds instead of berths, some with Pullmans as extras. Moreover, the latest Thermotank Punkah Louvre system of ventilation is fitted throughout the passenger quarters, in staterooms and public rooms alike, to meet varying range of climate conditions experienced on the service. It is also worthy of note that all cooking, heating, etc. are done by electricity; not a shovelful of coal need be carried on board, and the vessel is thus entirely clean from the defilement of coaldust and smoke.

Messrs. Heaton & Tabb & Co. of London decorated the sumptuous lounge, and immense room two decks high, situated amidships on "A" deck, with a lofty glazed dome over the central portion. The dome receives direct sunlight, which, coming in through its amber-colored glazed glass, creates a restful atmosphere in the room. The color scheme is in turquoise blue, gold and ivory, and the design is simple in character, depending on harmonious coloring and architectural proportions for its effect. The floor is inlaid with oak parquetry and will be covered with large Coronal Wilton rugs of handsome Persian design, and by removing the rugs, it can also be converted into a perfect grand ball room of 2,024 square feet.

A regular stage with a lofty, semi-circular proscenium arch is at the fore end of room, and as the *Asama Maru* and the *Tatsuta Maru* are provided with, so this stage is also furnished with everything that is necessary for theatrical performances or concert. Motion pictures can also be projected on the stage. The passageways from the lounge to the smoking room, both on port and starboard sides, also constitute galleries, decorated in the style of glorious Florentine period.

"Simple but luxurious" are the words with which the scheme of decoration of the reading and writing room is described by Messrs. Ateliers Marc Simmon of Paris who did the work. They also executed the spacious and beautiful swimming pool, adjoining which is a large gymnasium provided with various equipment for exercise.

The most luxuriously decorated dining-saloon for first class passengers is located at the center of the "C" deck where the passengers are introduced to the N.Y.K. cuisine which the company is especially proud of, the N.Y.K. chefs and all culinary artists having been specially trained at hotels in New York, Paris and London.

On the top these excellent accommodations and facilities, there are a quaint Japanese room, nursery, ladies' hairdressing parlor, a dark room for amateur photographers, and a branch office of the Sumitomo Bank.

The superior appointments of the public rooms and excellent passenger accommodation are not limited only to the first class passengers but is also extended to the second class as well.

The name of the *Chichibu Maru* is taken from the Chichibu Shrine which stands in the town of Chichibu, not far from Tokyo. This famous Shinto Shrine was founded in the reign of Emperor Suinin (97-30 B.C.) and is dedicated to one of the deities who assisted the Sun Goddess when she ruled the Heaven and Earth.

It is expected that the equipment of this magnificent motorliner will be completed on March 25, this year, and, after being brought from Yokohama to Kobe on March 30, she will leave Kobe on April 1 on her maiden voyage across the Pacific for San Francisco and Los Angeles *via* Honolulu.

Brief History of N.Y.K.

On October 1, 1930, the Nippon Yusen Kaisha will celebrate its 45th anniversary of its existence. Since its foundation in 1885, its career has been one of unexampled progress and prosperity.

Prior to the formation of the N.Y.K. Line, there were two prominent steamship companies in Japan. The one was the Mitsubishi Kaisha and the other, the Kyodo Unyu Kaisha. The Mitsubishi Kaisha, which was the nucleus of the N.Y.K. was established by the late Mr. Yataro Iwasaki in 1871, and the Kyodo Unyu Kaisha, or the Union Transport Company, was organized in 1882. The latter, which was established in complaint against the virtual monopoly of the entire mercantile transportation by the Mitsubishi Kaisha, carried on its business in open competition with the Mitsubishi Company to such an extent that finally an arrangement was made for the merger of these two shipping concerns in 1885, resulting in the formation of the N.Y.K. Line.

It was in 1891 that the N.Y.K. inaugurated its overseas service. Admitting that it had operated previously lines to Chosen, North China, and that between Shanghai and Vladivostok besides the domestic coastwise service, these can hardly be called overseas service. But in 1891, the company opened the service between Kobe and Manila and dispatched steamers to Australia occasionally. And, in 1892, the Japan-Bombay line was started, it being the first regular steamship service of Japan with a far oversea country.

In the year 1896, that is the year immediately following the Sino-Japanese War, the company established its three trunk lines, namely, the Yokohama-London-Antwerp Line, the Hongkong-Japan - Seattle Line, and the Yokohama-Manila-Australia Line. Following the close of the Russo-Japanese War of 1904-5, the

Table A.—Preliminary Particulars

		Asama Maru *Tatsuta Maru*	*Chichibu Maru*	*Hikawa Maru* *Hiye Maru* *Heian Maru*	*Terukuni Maru* *Yasukuni Maru*	*Heiyo Maru*
Principal dimensions	Length over all	584′–0	583′–3	535′–9	531′–6	482′–1
	Length b.p.	560′–0	560′–0	510′–0	505′–0	460′–0
	Breadth moulded ...	72′–0	74′–0	66′–0	64′–0	60′–0
	Depth moulded	42′–6	42′–6	41′–0	37′–0	40′–6
Tonnage	Gross	16,947	17,300	11,600	11,800	9,700
	Net	10,018	10,200	7,000	7,200	5,800
	Dead weight	8,000	8,000	10,000	10,000	10,000
Draught	Loaded	28′–6	28′–6	30′–2	28.77	30′–2
	Light	19′–3	19′–5½	16′–7	15′–5	—
Capacities	General cargo :					
	Permanent	5,730	5,330	9,330	10,780	8,750
	Portable 3rd class ...	350	732	—	—	—
Passenger accommodation ...	1st class	188	192	79	121	42
	2nd class	96	95	69	68	80
	3rd class	504	500	138	60	500
Main engine	Type, No. of sets	Sulzer 2 cycle, single acting, 4 sets	B. & W. 4 cycle, double acting, 2 sets	Ditto	Sulzer 2 cycle, single acting, 2 sets	Ditto
	Dia. and stroke	8-680/1,000	8-840/1,500	8-680/1,600	10-680/1,200	8-680/1,200
	Normal B.H.P.	16,000 (designed)	Ditto	11,000	11,000	7,500
Auxiliary engines	Generator :					
	Type	Diesel, 450 k.W.	400 k.W.	325 k.W.	450 k.W.	280 k.W.
	Numbers	4	3	3	3	3
Donkey boiler	Nos. and size	2 ; 10-0 × 10-6	—	—	—	—
	Working pressure	120	120	120	100	100
Speed	Trial at half load	20.713	20.65	Over 18	Over 17	Over 16
	Average sea speed ...	18½-19	Ditto	15¾	15	14
Propellers	Nos. and dia.	4 ; 13′–6	2 ; 18′–0	2 ; 16′–6	2 ; 16′–3	2 ; 15′–0

Note : *Tatsuta Maru's* speed at trial at half load was 20.930 knots ; *Hiye Maru's* average Sea speed is 15¼ knots.

Table B.—Navigation Instruments

	Asama Maru *Tatsuta Maru*	*Chichibu Maru*	*Hikawa Maru* *Hiye Maru* *Heian Maru*	*Heiyo Maru*	*Terukuni Maru* *Yasukuni Maru*
Wireless direction finder	Kolster	Ditto	Telefunken	Ditto	Marconi
Range finder	Nihon Kogaku K.K.	Ditto	—	—	—
Gyro compass	Sperry MK VIII	Ditto	Ditto	Ditto	New Anschutz
Automatic steerer	Sperry 2 unit type	Ditto	Sperry single-unit type	—	—
Electric log	Walker	Ditto	Ditto	Ditto	Ditto
S. A. L. log	Marine type	Ditto	Type 12	—	Type 12
Automatic fire detecting system ...	Derby	Ditto	Nihon Denki K.K.	—	Nihon Denki K.K.
Automatic fire detecting and extinguishing system	Lux & Rich	Ditto	Ditto	Ditto	Ditto
Electric Clock	Magnetor	Pulsynetic	—	—	Magnetor
Engine revolution and direction indicator	Everscned & Vignoles	Siemens Halske	Ditto	Ditto	Ditto
Steering gear	Brown Brothers & Co.	Hele-Shaw	Ditto	Ditto	Brown Brothers & Co.
Sounding machine	Thomson	Thomson & Langeuin	Thomson Fathometor (*Hiye* only)	Ditto	Ditto
Principal decoration	Waring & Gillow	Marc-Simmons Heaton-Tabb	Marc-Simmons (*Hikawa Maru*) Yokohama Dockyard (*Hiye Maru*) Heaton Tabb (*Heian Maru*)	Wylie Lochhead	Ditto

N.Y.K. began a new development of its ocean lines, improving its passenger and cargo services, and creating new feeder lines to and from a large number of ports in the Far East. The opening of its Calcutta Line in 1911 constitute another important addition to its lines of service.

With the outbreak of the European War, the company made an all-round phenomenal development. In 1915, it was in possession of 93 steamers aggregating over 428,000 tons gross, and its exceptional financial position was such that against its paid up capital of Y.22,000,000, its reserves amounted to about Y.33,000,000.

Nineteen hundred and sixteen was also a busy year for the N.Y.K. Line. It opened a regular four weekly freight service between Far East and New York *via* Panama Canal, and then, it initiated a freight service between Japan and New Zealand. In addition, the company opened, during 1914-8, the Japan Liverpool Line, the Japan-Java-Calcutta Line, the Calcutta-New York Line, the Japan-Calcutta-Seattle Line, and some others. With the cessation of the hostilities with Germany, the company extended its Japan-London-Antwerp freight service to Hamburg.

A salient feature of the N.Y.K.'s activities in the post-war period of shipping inactivity is the opening of the Japan-China rapid express service in 1922, with placing of the *Shanghai Maru* and the *Nagasaki Maru*, 5,500 ton sister ships, between Nagasaki and Shanghai. These high speed vessels, by making the entire distance in 27 hours, created a new epoch in the near sea passenger traffic of the East. This expensive service was extended to Kobe in 1924.

Another feature is that the long pending proposal of separating the near services from the business of the N.Y.K. Line was settled by the establishment of the Kinkai Yusen Kaisha, with a share capital of Y.10,000,000. In lieu of cash payment to cover the N.Y.K.'s holding of the Kinkai Yusen Kaisha's shares to the amount of Y.9,150,000, the company contributed 22 steamers of 54,772 tons gross, in addition to land and building in Tokyo, Hokkaido, Taiwan, Tientsin and elsewhere.

Merger with T.K.K.

The long disputed incorporation of the greater part of the T.K.K. service into the N.Y.K. was materialized in May, 1926, and as the result, the N.Y.K. transferred to its flag the Orient-California and the Orient-South American west coast Services, on payment of Y.6,250,000 to the T.K.K. This payment was made by shares paid up to the face value. In order to effect this disbursement, the N.Y.K. increased its capital to Y.106,250,000, the paid up capital now standing at Y.64,250,000.

In consequence of this part amalgamation, the N.Y.K. fleet was increased by eight steamers, aggregating 100,000 tons gross, these steamers including the *Tenyo Maru*, *Shinyo Maru*, the *Korea Maru*, the *Siberia Maru*, the *Anyo Maru*, the *Rakuyo Maru*, the *Bokuyo Maru* and the *Ginyo Maru*. The operation of one Government vessel, the *Taiyo Maru*, has also been transferred to the N.Y.K.

When its present shipbuilding plan is complete, the fleet of the N.Y.K. and the K.Y.K. will number 150 vessels of 875,000 tons gross.

William Howard Taft

(Continued from page 98).

while flattering and sugary *a priori* opinions are dogmatically accepted as correct. From Mr. Taft in 1907 to Mr. Castle in 1930 the American official authoritative attitude toward Japan has been unchanged.

Mr. Taft represented the finest type of American official. Scholarly, great in spirit and vision, an effective administrator, guided by national traditions, he typified perhaps of the last of that remarkable coterie of personalities which formed about Theodore Roosevelt. Few men in American life have held so many exalted public offices as William Howard Taft—Governor-General of the Philippines, Secretary of War, President of the United States and Chief Justice of the Supreme Court. To each of these positions, he brought a mind, finely trained in the law, which was the basis of his political and economic thinking. An upholder of the Constitution, he was often regarded as reactionary but his broad humanism won for him a popularity which will outlive him.

Japan's Trade in China

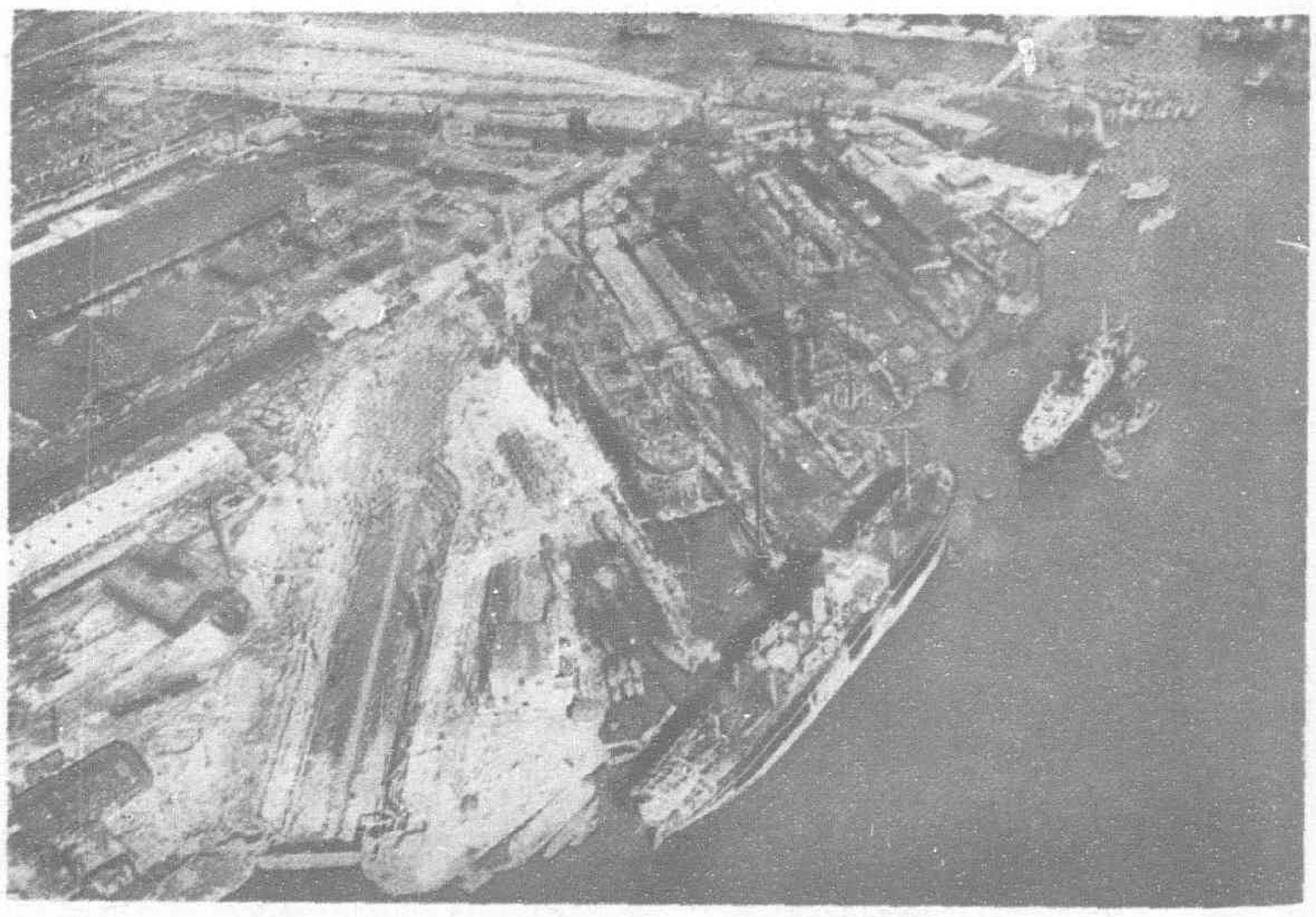
(Continued from page 100).

With the growth of the Ford and General Motors assembly plants in Japan, distributing these products throughout the Far East, it is not far from the truth to estimate the total at roughly Y.100,000,000. This figure is bound to increase rapidly as Japan reaches out more and more for export markets for her finished products. The amount of direct exports of American materials to China through the Japanese firms in New York is also bound to increase in proportion to the amount of new Japanese capital invested in Chinese industrial enterprises. There is every reason to believe that when the diplomatic questions between China and Japan are smoothed out, and a better feeling exists, there will be a revival of Japanese investment activity in Chinese industrial enterprises, and this, in turn, will make for a greater market for spare parts, accessories, renewals, extensions and the raw materials required to keep the plants in operation.

Although it would be unfair to American firms in China to state that the Japanese are the best salesmen for general American commodities in the country, they are undoubtedly the largest purchasers; and once their difficulties with the Chinese are amicably adjusted, they will become very strong competitors with the American firms on the ground. This trade trend that makes Japan the best customer for American goods in China constitutes the surest guarantee that friendly relations will prevail between America and Japan and that their policies with regard to China will harmonize and make for the political and economic stabilization of that country.

Sakurajima Plant of the Osaka Iron Works

THE Sakurajima works of the Osaka Iron Works, where the Seattle liner *Heian Maru*, a Burmeister diesel-engined 11,600 ton liner and the *Heiyo Maru*, a Sulzer diesel-engined 9,700 ton South American liner, are built, is located opposite Tempozan pier of the Osaka harbor. It was established in 1881 by Mr. Hunter, a British engineer, and to-day it has a capacity of building two 10,000 ton class vessels, two 7,200 ton vessels, and one 6,200 ton ship all at one time. In addition, it can produce 200 rolling stock and 20,000 tons of girders. This picture was taken from an airplane at the height of 100 meters by a staff photographer of the Kaizosha which issues the Japan Geographical System. Shown on the left is the *Heian Maru* in the early stage of construction.



Sakurajima Works of the Osaka Iron Works

The New Dollar Liners

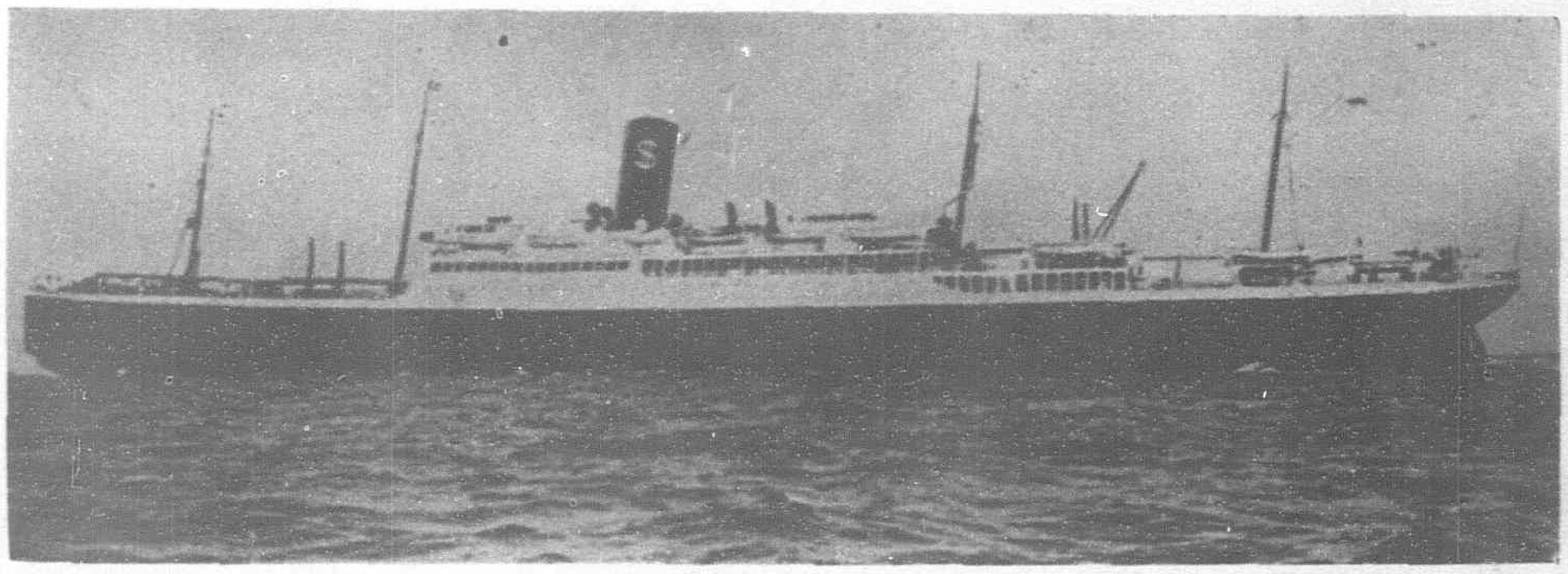
The construction of two super-passenger liners for the Dollar Line round-the-world service has been begun at the yards of the Newport News Shipbuilding and Dry Dock Company. These ships, which will be the largest and highest-powered commercial vessels ever built in American shipyards, will be propelled by turbine electric machinery developing 26,500 shaft horsepower.

The particulars of the two vessels are approximately as follows :

Length overall—653 feet
Length on waterline—630 feet
Length between perpendiculars—615 feet
Beam molded—81 feet
Depth molded to shelter deck—52 feet
Depth molded to upper deck—42 feet
Loaded draft—32 feet
Displacement at loaded draft—31,000 tons
Deadweight capacity at 34-foot draft—17,400 tons
First-class passengers—332
Tourist-class passengers—140
Oriental steerage—772
Crew—300
General cargo capacity—650,000 cubic feet
Refrigerated cargo capacity—70,000 cubic feet
Propulsion—Turbo-electric
Maximum shaft horsepower—26,500
Speed—20 to 21 knots
Fuel capacity—6,000 tons Oil
Boilers—12 Water-tube Babcock & Wilcox
Classification—American Bureau of Shipping
Sub-Division—British Board of Trade 1928 Rules.

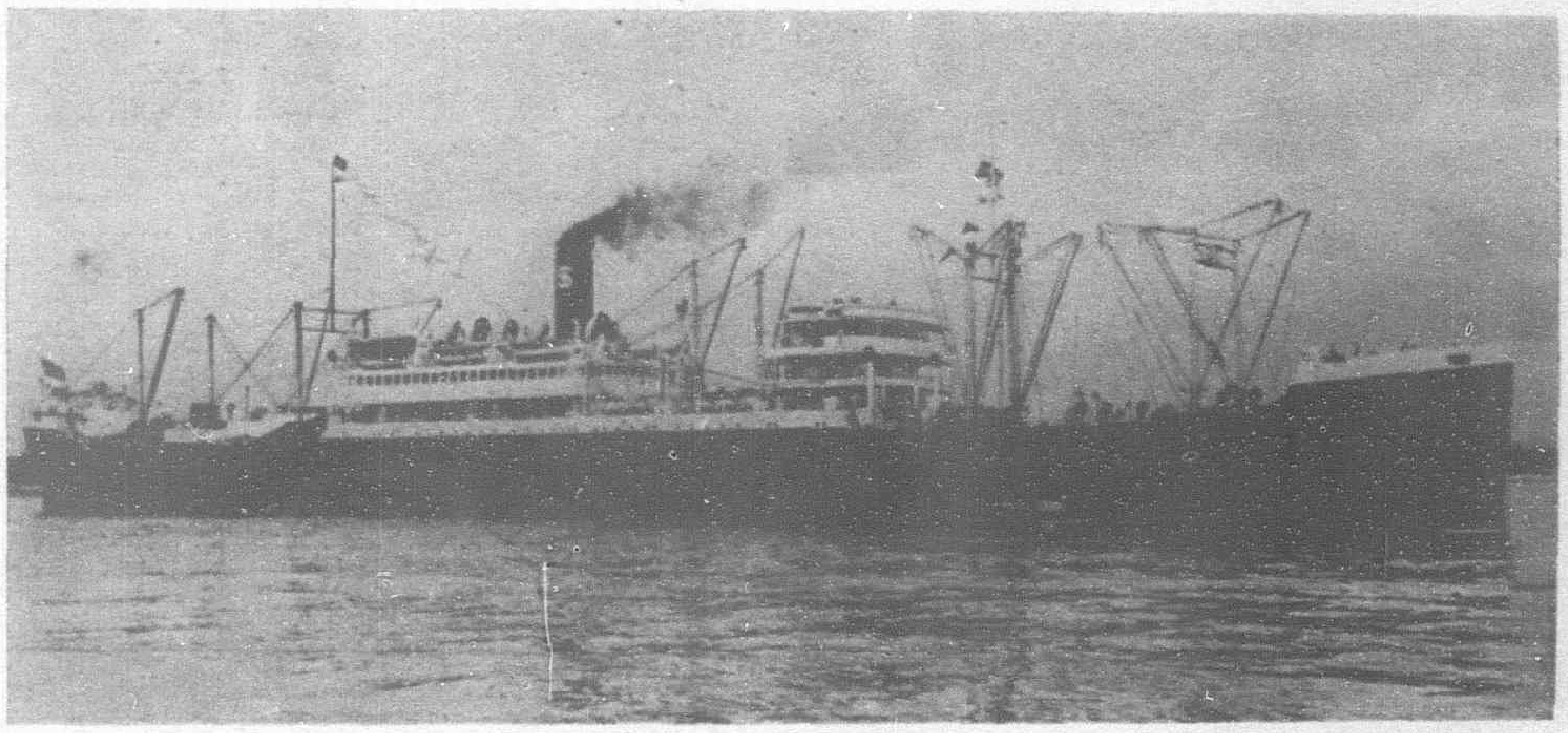
Propelling Machinery

The turbine generators, propelling motors for the twin screws and control of the propelling machinery, as well as the motors and control of the electrified deck and under-deck auxiliaries of one of the ships, will be supplied by the Westinghouse Electric and Manufacturing Company.



S.S. "President Johnson"

Power for the propelling motors is furnished by two main turbine generator sets which operate with steam at 275 pounds gauge throttle pressure and 200 degrees Fahrenheit of superheat. The turbines exhaust into a vacuum of 28 inches, the condensers being installed below the turbines. Each set is rated 10,200 kw., at 4000 volts, three-phase, at a speed of 2,660 r.p.m. at full power. The main generators have a closed system of ventilation, water-cooled air coolers being used. The turbines are of the Westinghouse combination impulse and reaction type.



S.S. "President Monroe," on San Francisco-Manila-Singapore Direct Service

The two propelling motors, driving twin screws, are of the synchronous induction type, each rated at 11,000/13,250 shaft horsepower at a speed of 125/133 r.p.m. The motors have an open system of ventilation which exhausts on deck. Cooling air is provided by two blowers, each driven by a 25-horsepower motor and capable of delivering 37,000 c.f.m. against a static pressure of 2½ inches of water.

The propulsion control employs air-break main switches, operated by levers and completely interlocked to insure correct operation. Under normal conditions of operation, each turbine generator set supplies power directly to a propelling motor. However, provision has been made for driving both motors from one turbine generator set, which permits economical steaming at reduced speeds. With the latter arrangement, about 65 per cent. of the ship's full speed can be maintained.

Auxiliary power is furnished by four Westinghouse turbine generator sets of 500 kw. each. These auxiliary sets operate at the main line steam conditions of 275 pounds, with 200 degrees of superheat.

The electrified deck auxiliaries include the cargo winches, another windlass, warping capstans, automobile capstans and boat hoists. There are 20 cargo winches driven by 35-horse-power motors, and four 25-horsepower winches. The anchor windlass is driven by a 75-horsepower motor, while two warping capstans are also driven by a 75-horsepower motor each. The two automobile capstans are each equipped with a 15-horsepower motor, the two boat hoists being driven by 25-horsepower machines. All of the deck auxiliary motors are of the Westinghouse waterproof type.

The electrified underdeck auxiliary machinery comprises the following equipment : four 100-hp. main circulating pumps, two 30-hp. auxiliary circulating pumps, two 75-hp. motors for the steering gear, two 50-hp. sanitary and deck wash pumps, three 10-h.p. main condensate pumps, three 5-h.p. auxiliary condensate pumps, one 15-h.p. ballast pump, two 7.5-h.p. fresh water pumps, one 5-h.p. hot fresh water pump, one 3-h.p. ice water circulating pump, four 100-h.p. CO_2 compressor motors, two 20-h.p. brine circulating pumps, two 7.5-h.p. CO_2 condenser circulating pumps, four 22-h.p. forced draft fans, two 10-h.p. engine turning motors, one 5-h.p. machine shop motor.

All of the foregoing underdeck motors are of the Westinghouse semi-enclosed, self-ventilated type, except the 10-h.p. engine turning motors, which are of the totally enclosed type.

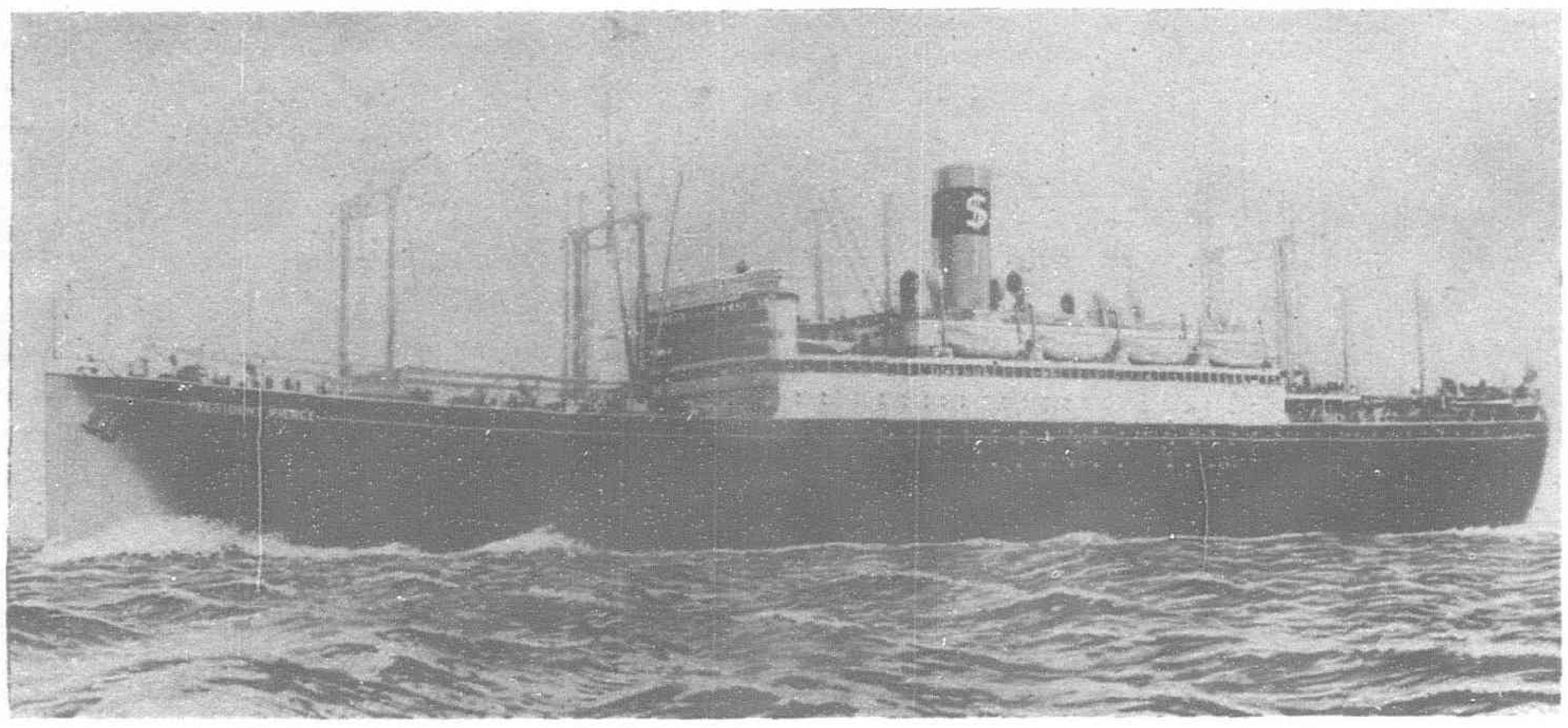
Other Dollar Improvements

During the year extensive alterations were completed, remodeling state-rooms and public rooms on the following ships :

President Taft, President Lincoln, President Pierce, President Cleveland, President Madison, President Jackson, President Grant, President McKinley, President Jefferson.

Thirty-six-inch Simmons beds, with latest type mattress, have been installed, children's playroom, beauty parlour, other public rooms improved by rearranging and redecorating, making the passenger accommodation of these steamers equal to the most modern steamers.

The steamers of this type have a length of 535 feet, breadth 72 feet, displacement tonnage of 21,167 tons, gross tonnage of 14,123.



S.S. "President Pierce," of the Popular 535-ft. Class, in Trans-Pacific Service

During the year the steamers *President Garfield*, *President Adams* and *President Harrison*, of the Round-the-World Fleet, were completely reconditioned in the shipyards. Passenger accommodations were enlarged considerably and state-rooms and public rooms rearranged to make these steamers strictly modern. Plan followed in remodelling these vessels is similar to that of the *President Polk*, which had been rebuilt previously.

The most important addition to the Round-the-World Fleet is the *President Johnson* (former *Manchuria*) and *President Fillmore* (former *Mongolia*), sister ships.

The *President Fillmore* was acquired by the Dollar Steamship Line from the Panama Pacific Line, and was delivered to the Newport News Shipbuilding & Dry Dock Company on October 19, 1929. The work was executed at this plant, and the vessel was redelivered to the Dollar Line on January 12, 1930. This allowed just 70 working days (85 consecutive days) for the completion of all the work involved.

The principal characteristics of the vessel are as follows :

Length, O. A.	615 ft. 8 in.
Length, B. P.	600 ft. 0 in.
Beam, molded	65 ft. 0 in.
Depth of upper deck	43 ft. 3 in.
Gross tonnage	14,328 tons

Boilers—Four double-ended, four single-ended Scotch, oil-fired.
Engines—Two quadruple expansion.
Horsepower—Approximately 15,000 i.h.p.
Speed—16 knots.

The reconditioning and betterments involved work on six decks and the house-tops. This included the removal of all first-class state-rooms on the promenade and "A" decks and the removal of all tourist state-rooms on "B" and "C" decks. Seventy-five new state-rooms were installed on the promenade, "A" and "B" decks to accommodate a total of 195 first-class passengers. Twenty-two new interchangeable tourist and first-class state-rooms were also installed on "B" deck aft, to accommodate 66 passengers.

The first-class public rooms, such as the dining-room, social hall and smoking-room, were entirely rebuilt, redecorated and refinished, and a new verandah café was erected on the after end of the boat-deck abaft the first-class smoking-room. The tourist lounge was rebuilt and a new tourist dining-room and pantry were installed.

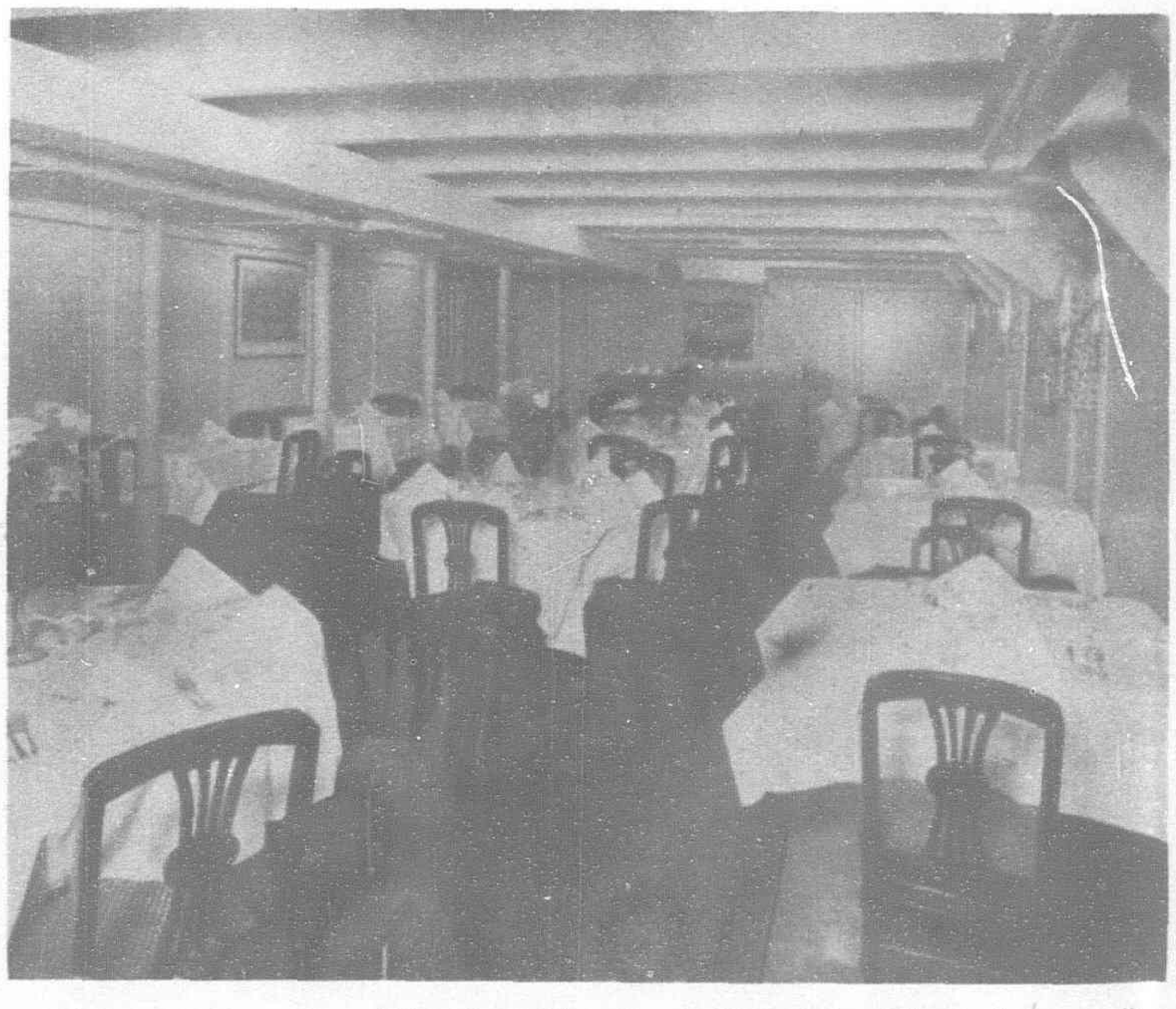
All of the first-class and tourist baths and toilets on the promenade "A" and "B" decks were removed and entirely renewed. The crew's spaces on "B" deck were rearranged and partly renewed. In order to gain more room in the promenade deck-house the boiler and engine casings were moved two feet inboard on the port and starboard sides between the boat and promenade decks. This allowed wider passage-ways and state-rooms on this deck.

Eight new refrigerated spaces, with a total capacity of approximately 40,000 cubic feet, were installed on "D" and "E" decks aft of the machinery spaces. Besides the large insulation job, these spaces required the installation of 16 new pieces of refrigerating machinery. The machinery and the coils were furnished by the Brunswick-Kroeschell Company, and this company facilitated the installation by making very fast delivery on their equipment. The four CO_2 compressors for this job are each six to eight tons capacity.

Accommodations were provided for about 600 steerage passengers in convertible and cargo spaces on "B" and "C" decks, and seven trunked hatches were provided with sliding doors and strong backs in way of these spaces. A number of new steel bulkheads and watertight doors were installed, and other miscellaneous steel work was accomplished.

The new first-class and tourist state-rooms installed on the promenade "A" and "B" decks are each fitted with two 36-inch by 6-ft. 6-in. iron bedsteads, a settee, wardrobes, chiffoniers

Social Hall for "Special Class" on the "President Johnson"



Dining Saloon for "Special Class" on the "President Johnson" and a lavatory with running fresh water, hot and cold. All of these rooms are outside rooms, each room having two windows or ports. The joiner work in these spaces has a pleasing simplicity which is most attractive. The deck inway of state-rooms is covered with carpet.

Besides the renewal of all public toilets and baths in first-class quarters, 25 new private baths and toilets have been installed. Eleven of these are shower baths located between state-rooms on the promenade deck, and there are 14 private baths, with tubs and showers over them, located between state-rooms on "A" deck. All of the private baths and showers are wainscoted with green tiles and multi-colored borders.

The suite-de luxe is located on the starboard side of "A" deck abaft the dining saloon. This suits consists of a living-room, bedroom and bath. The living-room and bedroom are luxuriously furnished with exquisite period furniture of unusual design.

The passage-ways and lobbies are covered with green composition deck covering with black border. The green field is tooled into diamond-shaped blocks with black joints, which is a unique dpearture in marine work, but gives a pleasing variety and dignified appearance.

Two new stairways were constructed; the new main after stairway is of geometric design with hand-wrought iron balustrade, and leads from the after "B" deck lobby to the verandah café and smoking-room on the boat deck. The new forward stairway leads from the lobby abaft the dining saloon to the lobby at the forward end of "B" deck. These stairways are covered with rubber tiles.

The furniture in the public rooms and the suite was designed and built by A. F. Martin & Co., of San Francisco, and the interior decoration in these spaces was designed and executed under their supervision.

In the new verandah café the design was carried out in art moderne, which is a new departure in American vessels. The walls of this room, which are of Vehisote, are laid up with flush joints and no panel forming, thus giving a plain plaster effect. The window drapes are hung from concealed window boxes. A fine walnut parquet floor has been laid in this room for dancing. The radiators are concealed in the walls behind ornamental brass grilles which are hinged for easy access to the heating units. Colored wicker furniture and a hand-painted piano with futuristic designs give color and add attractiveness to this room.

Just forward of the verandah café is the smoking-room, which is paneled with natural finished oak and is fitted out with walnut tables, green morocco leather chairs and colorful drapes.

The social hall on the promenade deck has been entirely renewed. The design has a distinctive Directoire influence. Carved window casings, extending the full height of the room, have been built around the port-lights to give the effect of long windows. On the side walls are fine mural decorations, and the dome over this space also has mural decorations illuminated by indirect lighting. Fine flesh-colored damask hangings, a luxurious carpet and especially designed furniture complete this smart saloon.

Aft of the social hall is the main foyer, which has been enlarged and renewed with natural oak paneling, rubber-tile deck covering and handsome portable furniture. The purser's office is located on the after-side of this foyer. At the purser's window there has been installed a rustic finished, hand-wrought iron grille of design in keeping with the harmony of this space.

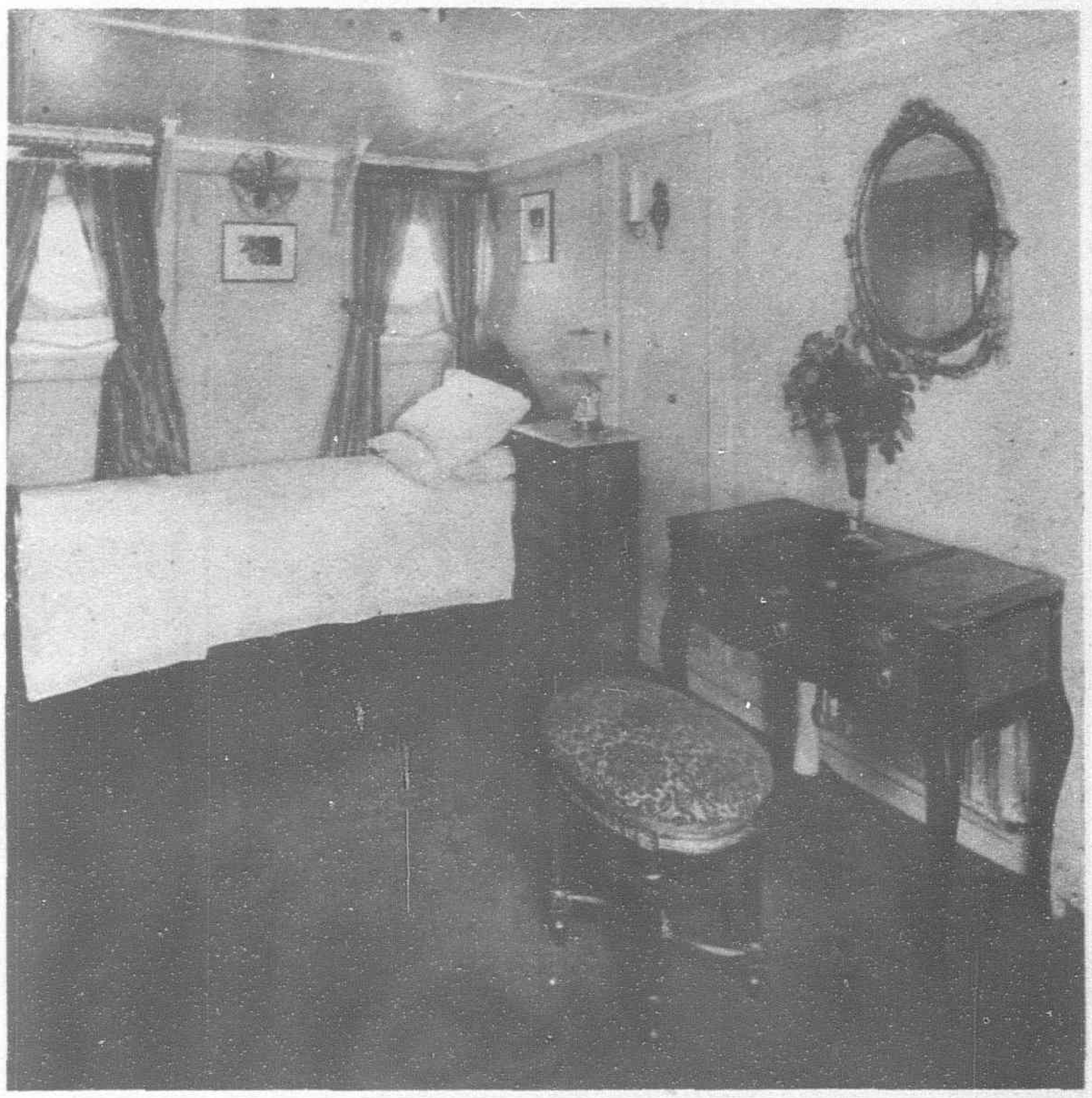
Dining Accommodations

The stairs leading down from the foyer provide access to the dining-room on the deck below. The dining-room is a very spacious room and has been rearranged and provided with 38 small tables to accommodate 172 persons at one sitting. The main pantry is immediately abaft the dining-room on the port side. This space has been completely renewed and re-requipped. Just below the pantry is the first-class galley and bakery, which are reached by a ladder from the pantry. The galley and bakery have also been rearranged and re-equipped, including new oil-burning ranges and ovens.

On of the popular features of this vessel is the new swimming pool, which has been built on the after island house-top. This pool is built of steel. The permanent decking around it is covered with white corrugated rubber. Access to this pool is by means of a portable gangway from the after-end of the promenade deck. A new portable moving picture booth was also installed, such that it can be moved to any convenient part of the vessel.

Both main engines were overhauled, the pistons were drawn and new piston rings were fitted. The crankshafts were removed to the shops, and one new journal was made and the other journals trued up. All main bearings as well as the thrust shoes were remetaled. The engines were reassembled and all necessary adjustments were made. The boilers were cleaned and tested, and a number of tubes and stays were renewed. Many of the auxiliaries were also overhauled. Three condenser tube sheets were renewed and the condensers were retubed and tested. One hot well was renewed and several foundations in machinery spaces were repaired. New hot fresh and salt water tanks were installed. The docking and engine telegraphs were overhauled.

The boat-deck was entirely renewed with Oregon pine decking and teak margins. All other weather decks were repaired. A part of the rigging was renewed. The vessel was drydocked and all necessary underwater work was accomplished. Additional lifeboats were installed and all safety devices were overhauled to comply with the high standards of the owners.



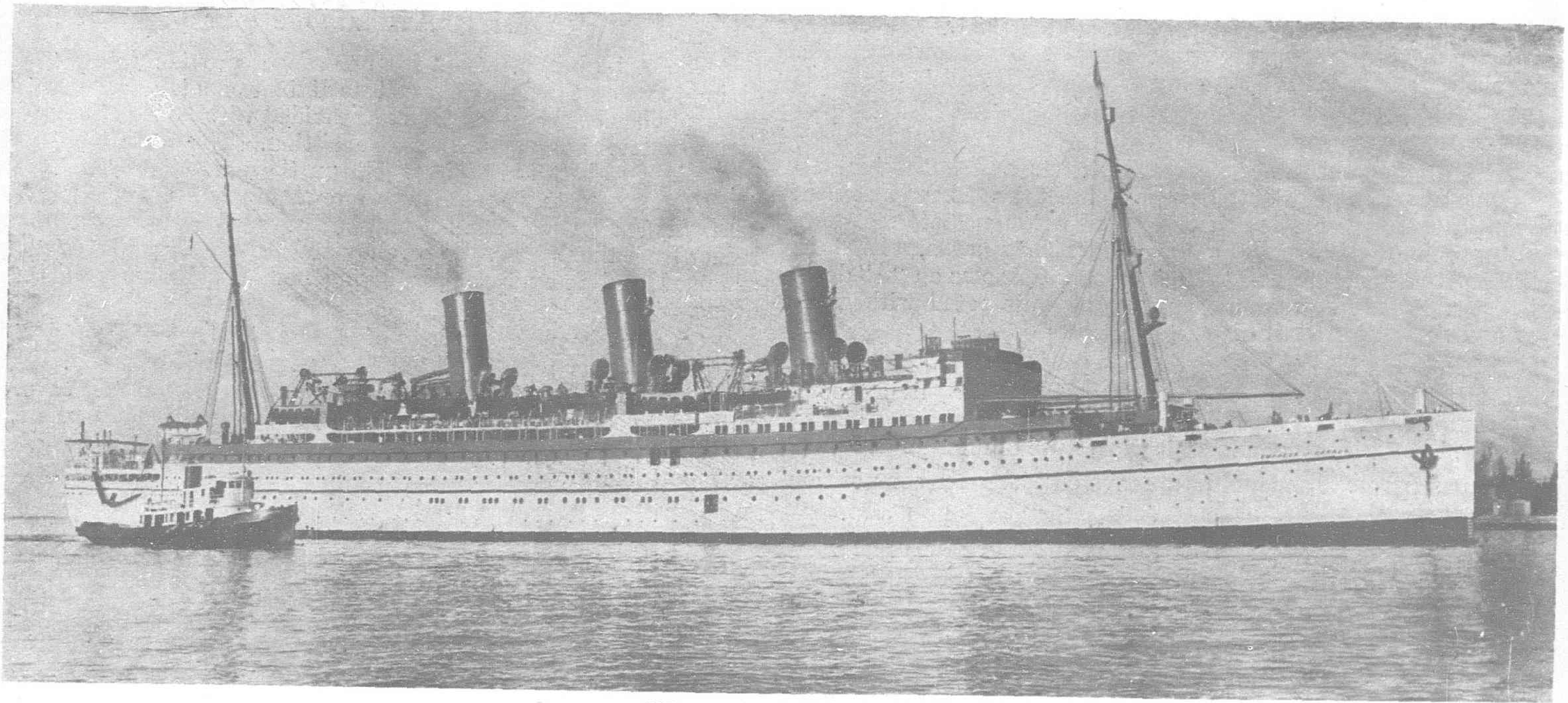
Cabin de Luxe on the "President Johnson"

Direct Singapore Route

To provide better service to Southern ports, the Dollar S.S. Line on August 28, 1929, started a new trans-Pacific service between the ports of Los Angeles, S.F., Honolulu and Manila, with the s.s. *President Hayes*, formerly in the Round-the-World Service. On the first voyage the steamer returned to U.S. by way of Hongkong, but on the second voyage called at Singapore instead. Permanent route of this service is now Los Angeles, San Francisco, Honolulu, Manila, Singapore, returning by same ports. Monthly sailings are maintained by the liners s.s. *President Hayes* and *President Monroe*.

This service is proving very popular in the South, as it provides a direct route to Honolulu and San Francisco from Singapore.

THE *TSINAN*.—Madame Chen Ming-shu, the wife of General Chen Ming-shu, on January 24 christened the *Tsinan*, the new steamer built by the Taikoo Dockyard & Engineering Co. to the order of the China Navigation Co. for the Canton, Hongkong and Shanghai trade.



"Empress of Canada"

The "Empress of Japan"

Destined to be the Queen of the Pacific, the 25,000-ton liner *Empress of Japan*, latest addition to the Canadian Pacific's Oriental Service, was launched from the Fairfield Yards on the Clyde December 17, 1929.

Six decks lettered "A" to "F" and a superstructure containing the promenade and boat deck are to passenger requirements. Both the boat and promenade decks exceed 300 feet in length.

Luxury, an overworked word in connection with steamships, is really justified on this occasion and is the keynote of the interior accommodation of the *Empress of Japan*. First class rooms, practically all outside cabins, are fitted with bedsteads in every instance. They are lavishly lighted, and the ball-louvre system of controllable ventilation, first instituted in the Canadian Pacific "Duchess" liners on the Atlantic, is supplemented by electric fans. Steam is used for heating and this system is also amplified by electric heaters in each room. Pedestal basins with running hot and cold water, pier glass mirrors in the wardrobes, tripled mirror dressing tables, and hotel type bathrooms are features of the sleeping cabins.

Suites and special state-rooms are connected with every department by a comprehensive telephone system. Suites are decorated with olive wood panelling, the furniture is covered with purple damask, and the twin beds are recessed. Each suite possesses a sitting-room done with landscapes in a grey toned and tile verandah with wide windows surrounding flower boxes. Special staterooms are decorated in walnut with satin-wood enrichments and Quebec birch.

Grey-green-blue Cipollino marble with gilded bronze mountings has been employed in the dining-room, which seats 294 people. The center of the room is a high well, on each side of which is a running gallery with a musicians' gallery at the after end. The furniture is of dark carved mahogany. Entrance to the dining saloon is obtained through a Louis XIV foyer in which the marble treatment of the saloon is repeated in massive columns. Illuminated alabaster ornaments mark the termination of the two carved balustrades of the grand staircase that ends in the foyer.

Large windows are a feature of the public rooms, which consists of a ball-room and palm court forward, card, writing, lounge, smoking-room, cocktail bar, gymnasium and, of course, a well appointed children's room.

Elevators are installed at convenient points to connect all decks, and direct connection between the gymnasium and the green and black marble swimming tanks five decks below on "D" deck is maintained by a fast private elevator. The pool has its own refreshment booth, spectators' balcony, dressing boxes, and electric bath, and is lighted by an underwater system.

Other features are barber and hairdressing shops, manicuring and chiropody saloons, shops, stenographers' offices and photographic dark room. On the operating side of the ship such up-to-date appliances as Welin-Machlachlan davits, electric sounding machines, submarine signal apparatus, electric clear view screens, and all the usual devices such as wireless direction finders, etc.

The propelling machinery consists of geared turbine engines, developing an average sea speed of 21 knots. The principal dimensions are :—Length overall, 666 feet ; breadth, 87 feet ; depth ("A" deck) 56 feet.

By comparison, the *Empress of Canada*, at present the largest ship on the Pacific run, has a tonnage of 21,517.

There are six decks on the new vessel, running fore and aft. The superstructure consists of boat and promenade decks, each over 300 feet in length, topped by the navigating bridge which, 68 feet above the load waterline, is the most up-to-date and complete of its kind.

The *Empress of Japan* will have a carrying capacity of 400 first, 164 second, 100 third-class and 548 Asiatic steerage passengers. Accommodation for first-class passengers is on boat A and B decks, for second-class passengers aft on B and C decks, and for third-class passengers aft on D deck. The second class cabins on B deck can, on occasion, be rapidly converted into first-class state-rooms.

All the electric appliances are as perfect as modern science can make them. They include, to name only a few, radio telegraph, direction finding and submarine signalling apparatus, sounding machines, gyro-compass, clear view screens, orchestra and phonograph repeater installation, motion picture apparatus, and an extensive telephone system. The lighting, heating, cooking and power installations, of latest type throughout, are developed to a degree hitherto unattained on any first-class liner.

The vessel will be propelled by twin screws actuated by a set of single-reduction geared turbines. These are of Parsons' latest type, consisting of h.p., i.p. and l.p. units in series, designed to employ steam at a working pressure of 375 lbs. superheated to a temperature of 700 degrees F.

The machinery is of 30,000 s.h.p., and the steam is generated by Yarrow water-tube boilers. It is anticipated that the fuel consumption resulting from the adoption of these steam conditions will be less than. 6 lbs. of oil per s.h.p. hour, representing an expenditure of less than 11,000 B.T.U.'s per hour for each horse-power delivered at the propellers, including all passenger requirements, which are very large in a modern liner of this class.

The choice of machinery was largely influenced by the success which resulted from the adoption of this class of machinery in the "Duchess" class of ships built for the same owners recently, although the s.h.p. of these vessels was only 17,000 s.h.p.

The total weight of the machinery is 3,200 tons, a reduction of 200 tons on that of the *Empress of Canada*, which, moreover, had only two-thirds the horse-power. The bunkering capacity of both vessels is 6,100 tons, but the *Empress of Canada* was originally rated at 19 knots, but since has been accelerated to 21 knots, while the *Empress of Japan* will steam at least at 21 knots. This bunker capacity will make possible a complete voyage of 13,000 miles without re-fuelling.

Though the vessel is primarily intended for passenger traffic, a considerable proportion of the 10,200 tons deadweight is allotted to cargo. The total capacity of the permanent cargo holds and between decks is 304,000 cubic feet. This includes 59,000 cubic feet on the main and lower decks specially arranged for silk transport, and 33,000 cubic feet for insulated cargo. The total cargo capacity can be increased to 380,000 cubic feet when the number of Asiatic steerage passengers is reduced by about 480.

The "Empress of Canada"

The *Empress of Canada*, completed in 1922 at the Fairfield yard for the same owners, is an ocean liner of the highest class, but the speed of 19 knots, for which she was originally designed, was not sufficient for the new accelerated program. The experience gained with the *Empress of Australia* after the installation of new single reduction geared turbine machinery using a high degree of superheat showed that with the increased horsepower a radical reduction in the daily fuel consumption together with increased speed can be obtained.

As a result of this experience, Canadian Pacific Steamships, Limited, decided in the case of the *Empress of Canada* to remove the original propelling machinery, which was of the double-reduction geared Brown-Curtis type, using saturated steam, and to instal in its place single-reduction geared turbines of the most modern Parsons type, using super-heated steam and capable of developing 40 per cent. more shaft horsepower than was possible with the original machinery.

The contract for the conversion was placed with the Fairfield Shipbuilding and Engineering Company, Limited, which company, it will be recalled, also carried out the conversion of the machinery of the *Empress of Australia* for the same owners about two years ago.

In the *Empress of Canada* the original style boilers are retained, as they were designed with dimensions of ample size and were shown to be capable of providing, with a good margin, the whole of the steam now required for the increased shaft horse-power with the more economical design of turbines which have now been installed.

The conception of these alterations is the work of Mr. J. Johnson, the chief superintendent engineer of Canadian Pacific Steamships, Limited, under whose personal supervision the whole of the work has been carried on. The vessel have now returned to service, and again the results have fully justified Mr. Johnson's bold ideas in striving to obtain the greatest overall economy, or, perhaps, more correctly stated, the final decimal point in fuel consumption.

It was decided to retain the funnel and thrust shafting as originally fitted, but the propellers, which were of the built type, were replaced by new propellers of the solid type, cast in manganese bronze and designed to suit the increased power revolutions and speed.

Two sets of new turbines with single-reduction gearing were constructed by the Fairfield Company and installed to suit the original lines of shafting. Each set of turbines consists of one h.p. ahead, one i.p. ahead, and one i.p. ahead turbine, each driving the main gear wheel through an independent pinion. The i.p. turbine is of the double flow type, and an h.p. astern and an i.p. astern turbine are incorporated in the casings of the i.p. and ip. ahead turbines respectively. Attention may be called to the very massive turbine and gear base-plates which, bolted directly on to the tank top, give great rigidity and steady running. The designed service output of the installation is 26,000 s.h.p., with a maximum output of 29,000 s.h.p. Arrangements are made so that in case of necessity any one of the ahead turbines may be readly withdrawn from service and the voyage continued with the remainder of the turbines in use.

New condensers of the Weir regenerative type, with cupronickel tubes, together with new air-pumps of the Weir "Paragon" type, were added, these being designed to ensure the installation being capable of mintaining a high vacuum in tropical waters.

The original feed heating arrangements consisted of a low-pressure surface heater taking exhaust steam from the reciprocating auxiliary machinery and a direct contact heater supplied with exhaust steam from the turbo-generators. The feed temperature available from these heaters averaged 22 degrees Fahr. An additional high-pressure surface heater has been fitted on the feed pump discharge. from which steam is bled from an appropriate stage of the h.p. turbines and the feed temperature is thus raised to 300 degrees Fahr.

The boilers which supply steam for the main engines have been fitted with super-heaters of the smoke-tube type, supplied by the North-eastern Engineering Company, Limited. These super-heaters have an unusual feature, which have been developed by Mr. Johnson in conjunction with the makers namely in that the top rows project into the combustion chambers 9 inches, the projection gradually decreasing to 4 inches at the bottom. The installation is designed to give a steam temperature of 50 degrees Fah. at the super-heater outlet.

As a further aid to economy two generators, each of 210 kW. output, and driven by oil engines, made by W.H. Allen, Sons, & Company, Limited, have been installed. These generators are capable of supplying (together) the current necessary, for the total requirements of the vessel. The original generators, driven by steam turbines, have been retained for stand-by purpose.

In order to comply with the most recent Board of Trade requirements, there have been fitted a new emergency bilge pump and two emergency oil engine generator sets, and the Lux-Riche system for fire extinguishing is installed throughout the boiler-rooms, while new motor-driven sanitary pumps have also been added.

The vessel recently completed her trials with the new machinery on the Clyde, with very satisfactory results. An average speed of 22.4 knots was obtained during the runs up and down the Arran measured mile, which compared most favorably with the maximum speed of 20 knots when the ship was originally built. Notwithstanding the greater speed, the fuel consumption has been considerably reduced.

Formerly, when making the record trip on the Pacific service, the average speed obtained was 20.6 knots on a consumption of 284 tons of oil fuel per day. Since her conversion the *Empress of Canada* has made a westbound Transatlantic passage at an average speed of 20.53 knots on a daily consumption of 175 tons of oil per day, the displacements on the Pacific and Transatlantic voyages being approximately the same. During the first voyage the machinery was run under easy conditions. In due course, after the gears have been "run in," the power and speed will be increased.

New Gunboat for Siam

The new Siamese gunboat *Sukhoyada*, which has been specially designed for river, estuary, and coastline patrol service was launched from Messrs. Vickers Armstrongs' Naval Construction Works, Barrow, on November 19.

Madame Nunkae Bahiddha, wife of the First Secretary of the Siamese Legation in London, performed the launching ceremony. The British Admiralty were represented by Captain A. Maitland-Dougall of H.M.S. *Resource*. Commander C. W. Craven, managing director of the Barrow and Newcastle Works, represented the builders, and Sir Archibald C. Ross the builders of the engines, Messrs. R. & W. Hawthorn Leslie, of Newcastle.

The *Sukhoyada* is a steel twin-screw ship with a length of 173 feet, and is similar to one built on the Tyne by Messrs. Armstrong Whitworth. She has armor belt of nickel steel fitted for her full length, with armor bulkheads and screens. The upper deck is plated with heavy steel to afford protection against aerial attack. She will carry two 6 inch guns and four 3 inch high angle guns with the latest system of fire control. Ammunition will be carried to the guns by electrical power. The main propelling machinery consists of two sorts of inverted triple-expansion engines capable of developing 850 horse power, steam being supplied by two water tube boilers.

Survey of Shipbuilding in Japan

By YUKIO YAMAMOTO, Director of Ship Section, Mercantile Marine Bureau, Department of Communications, of the Japanese Government and KANAME INOUYE, Expert of the Same Department

THE development of modern mercantile steel-shipbuilding in Japan commenced 34 years ago when the s.s. *Suma Maru,* 1,500 tons gross, was launched in 1895. Three years after, (1898), the s.s. *Hitachi Maru,* 6,100 tons gross, and nine years thence, (1907), the s.s. *Tenyo Maru,* 13,400 tons gross were launched. Last year (1928) the motor ship *Asama Maru,* 17,000 tons gross was launched. With the present shipyards, their equipment, experts and workmen, it is possible to build even the world's biggest ship, 60,000 tons gross and 1,000 feet long.

Typical merchant ships built in Japan.

Passenger Ships and Passenger Cargo Ships

(1) In 1898, the s.s. *Hitachi Maru,* a passenger cargo ship of 6,100 tons gross and 14 knots maximum speed, was launched at the Mitsubishi Shipyard, Nagasaki, for the Nippon Yusen Kaisha's new Japan-Europe Line. From 1899 to 1902 the same shipyard launched four passenger-cargo steamers of 6,300 to 6,400 tons gross for the same line.

(2) In 1903 the same shipyard launched the s.s. *Nikko Maru,* 5,500 tons gross and 17 knots maximum speed, for the N.Y.K. Japan-Australia Line. This was the first large passenger ship built in this country.

(3) In 1904, the same shipyard launched the s.s. *Tango Maru,* a passenger-cargo ship of 7,400 tons gross, for the N.Y.K.'s. Hongkong-Japan-Seattle Line.

(4) From 1907 to 1909, for the improvement of the Japan-Europe Line, the N.Y.K. built the s.s. *Kamo Maru* and five other passenger-cargo steamers, 8,500 tons gross each, four of them launched at the Mitsubishi Shipyard, Nagasaki, and two at the Kawasaki Dockyard, Kobe.

In the same period, the Mitsubishi Shipyard, Nagasaki, launched for the Teikoku Kaiji Kyokai the two steamers *Sakura Maru* and *Umegaka Maru,* 3,200 tons gross each, which had steam turbines and Miyabara water tube boilers and were high speed passenger ships of 21 knots maximum speed, forming a volunteer fleet.

(5) From 1907 to 1911, for the Hongkong-Japan-San Francisco Line, the Toyo Kisen Kaisha had three steamers, the *Tenyo Maru, Chiyo Maru* and *Shinyo Maru,* 13,400 tons gross and 20 knots maximum speed each, built at the Mitsubishi Shipyard, Nagasaki. These ships had steam turbines and were the biggest and most excellent transpacific passenger liners at that time.

(6) From 1909 to 1911, the Osaka Shosen Kaisha had, for their new Hongkong-Japan-Puget Sound Line, the s.s. *Seattle Maru* and five other passenger-cargo steamers, about 6,000 tons gross each, three of them built at the Kawasaki Dockyard, Kobe, and three at the Mitsubishi Shipyard, Nagasaki.

(7) In 1913 the Teikoku Kaiji Kyokai added to their volunteer fleet a passenger turbine-steamer, *Sakaki Maru,* 3,800 tons gross and 19 knots maximum speed, launched at the Kawasaki Dockyard, Kobe. This ship was sold to the South Manchurian Railway in 1923 when the fleet was dissolved.

(8) From 1913 to 1923, for its European Line, the Nippon Yusen Kaisha built nine high class passenger-cargo steamers, the *Katori Maru* to the *Hakusan Maru,* about 10,500 tons gross and 16 knots maximum speed each, seven of them launched at the Mitsubishi Shipyard, Nagasaki, and two at the Kawasaki Dockyard, Kobe. Among them the *Katori Maru* had combined reciprocating and turbine engines, and the *Hakasan Maru* and four other steamers, double reduction geared turbines.

(9) From 1923 to 1928, the Osaka Shosen Kaisha had several fine passenger motor ships of 600 to 1,600 tons gross launched at various shipyards. These ships are now running the Inland Sea and other coast-wise routes.

(10) From 1925 to 1926 the same owners built for the Japan-South America (East Coast) Line, three emigrant passenger motor ships, *viz.* the *Santos Maru, La Plata Maru* and *Monte Video Maru,* 7,200 tons gross and 15 knots maximum speed each, launched at the Mitsubishi Shipyard, Nagasaki.

(11) Last year (1928) the same owners had the passenger-cargo steamer *Uraru Maru* with geared turbine engines, 6,100 tons gross and 17 knots maximum speed, for the Kobe-Dairen Line, launched at the Mitsubishi Shipyard, Nagasaki.

(12) From last year (1928) to this year (1929), the Nippon Yusen Kaisha had three passenger motor ships, *viz.* the *Asama Maru, Tatsuta Maru* and *Chichibu Maru,* 17,000 tons gross and 20 knots maximum speed each, the former two launched at the Mitsubishi Shipyard, Nagasaki, and the latter one at the Yokohama Dockyard, Yokohama. They are the latest and finest transpacific liners with the most complete and elaborate accommodations to run on the Hongkong-Japan-San Francisco Line which was transferred to the present owners from the Toyo Kisen Kaisha in 1926.

(13) This year (1929), the same owners had the passenger and cargo motor ship *Hikawa Maru,* 11,000 tons gross and 18 knots maximum speed, for the Hongkong-Japan-Seattle Line, launched at the Yokohama Dockyard, and next year (1930) two more sister ships for the same line will be launched, one at the same yard and the other at the Osaka Iron Works, Osaka.

(14) This year (1929) the Osaka Shosen Kaisha had the emigrant passenger motor ship *Buenos Ayres Maru,* 9,500 tons gross and 17 knots maximum speed, for the Japan-South America (East Coast) Line, launched at the Mitsubishi Shipyard, Nagasaki; and this year (1929) a sister ship for the same line will be launched at the same yard.

(15) This year (1929) the Nippon Yusen Kaisha had the passenger and cargo motor ship *Heiyo Maru,* 9,500 tons gross and 16 knots maximum speed, for the Japan-South America (West Coast) Line, launched at the Osaka Iron Works, Osaka.

(16) Near the end of this year (1929) the same owners will have a passenger and cargo motor ship, 11,800 tons gross and 17 knots maximum speed, for the Japan-Europe Line, launched at the Mitsubishi Shipyard, Nagasaki, and next year (1930) a sister ship for the same line will be launched at the same yard.

Shallow Draught River Steamers

Shallow draught steamers, of the Nisshin Kisen Kaisha or of their predecessors with light hulls adapted for use in the Yangtze River or thereabouts and with fine passenger accommodations, were launched in Japan as follows :—

(1) 1899, s.s. *Ta-Yueng Maru,* 1,700 tons gross, at the Kawasaki Dockyard, Kobe.

(2) 1900, s.s. *Ta-Lee Maru* 2,200 tons gross, at the Kawasaki Dockyard, Kobe, and s.s. *Ta-Foo Maru,* 2,200 tons gross, at the Mitsubishi Shipyard, Nagasaki.

(3) 1901, s.s. *Ta-Chang Maru,* 2,700 tons gross, at the Mitsubishi Shipyard, Nagasaki, and s.s. *Ta-Chi Maru,* 2,000 tons gross, at the Osaka Iron Works, Osaka.

(4) 1903, s.s. *Siang-Kiang Maru* and s.s. *Yuen-Kiang Maru,* 900 tons gross each, at the Osaka Iron Works, Osaka.

(5) 1905, s.s. *Ta-Hung Maru,* 1,700 tons gross at the Mitsubishi Shipyard, Nagasaki.

(6) 1906 to 1907, s.s. *Yoh-Yang Maru,* s.s. *Nang-Yang Maru* and s.s. *Shang-Yang Maru,* 3,500 tons gross each, at the Kawasaki Dockyard, Kobe.

(7) 1915, s.s. *Feng-Yang Maru,* 3,900 tons gross, at the Osaka Iron Works, Osaka.

Channel Passenger and Cargo Steamers for Railway Connections

(1) In 1905 the steamers *Iki Maru* and *Tsushima Maru,* 1,600 tons gross and 16 knots maximum speed each, for the Tsushima Channel Line, were launched at the Mitsubishi Shipyard, Nagasaki.

(2) In 1912, the steamers *Koma Maru* and *Shiragi Maru,* 3,100 tons gross and 16 knots maximum speed each, for the same line, were launched at the Kawasaki Dockyard, Kobe.

(3) In 1921 and 1922 the steamers *Keifuku Maru*, *Tokuju Maru* and *Shokei Maru*, 3,600 tons gross and 20 knots maximum speed each, for the same line, were launched at the Mitsubishi Shipyard, Kobe. These three excellent ships with geared turbine engines are now in the service, crossing the distance of 122 miles between Shimonoseki and Fusan in about eight hours, and connecting the trunk line of Japanese main land with Siberian railway *via*. Korean and South Manchurian railways.

Railway Car Ferry Ships

(1) In 1923 and 1924 the steamers *Shoho Maru*, *Hiran Maru*, *Tsugaru Maru* and *Matsumaye Marn*, 3,400 tons gross and 17 knots maximum speed each, where launched, the former two with Rateaux turbines at the Uraga Dockyard, and the latter two with geared turbines and Babcock and Wilcox water tube boilers at the Mitsubishi Shipyard, Nagasaki. These ships are now in the service connecting Aomori with Hakodate, traversing the distance of 60 miles of the Tsugaru Channel in four hours. Each carries 25 railway cars of 15 ton capacity as well as 900 passengers.

(2) In 1926 the s.s. *Seikan Maru No. 1*, 2,300 tons gross with geared turbines and Ikeda water tube boilers, for carrying railway cars exclusively on the same channel, was launched at the Yokohama Dockyard, Yokohama.

Oil Tankers

Large ships carrying oil in bulk were launched in Japan as follows :—

(1) 1909, s.s. *Kiyo Maru*, 9,200 tons gross, of the Toyo Kisen Kaisha, at the Mitsubishi Shipyard, Nagasaki.

(2) 1921 and 1922, steamers *Tachibana Maru*, *Manju Maru* and *Kanju Maru*, 6,500 tons gross each of the Teikoku Petroleum Co., the predecessors of the Asahi Petroleum Co., at the Harima Shipyard near Kobe, all having hulls built on Isherwood system.

(3) 1927 and 1928, motor ship *San Pedro Maru*, *Santiago Maru* and *San Luis Maru*, 7,200 tons gross each, of the Mitsubishi Trading Co., at the Mitsubishi Shipyard, Nagasaki, all having hulls built on F.K. system.

(4) 1928, s.s. *Shoyo Maru*, 7,400 tons gross, of the Nippon Tanker Co., at the Yokohama Dockyard, Yokohama, and 1929, s.s. *Yeiyo Maru*, 8,500 tons gross, of the same owners at the same yard, both having hulls built on Blythwood system.

(5) 1929, motor ship *Ogura Maru* with hull built on F.K. system 7,200 tons gross, of the Ogura Petroleum Co., at the Mitsubishi Shipyard, Nagasaki.

Dredgers

In 1911 and 1912 the Uraga Dockyard, Uraga, launched, for the Home Department, the steamers *Kizu Maru No. 1* and *Noda Maru*, 1,300 tons gross each, with Babcock and Wilcox water tube boilers. The Osaka Iron Works, Osaka, the Ishikawajima Shipyard, Tokyo, and other shipyards have since built several dredgers.

Submarine Cable Layers

In 1906 the Mitsubishi Shipyard, Nagasaki, launched the s.s. *Ogasawara Maru*, 1,400 tons gross, and in 1923 the Osaka Iron Works, Osaka, launched the s.s. *Nanyo Maru*, 3,500 tons gross, both for the Communication Department.

Nautical Training Ships

(1) In 1898, the Mitsubishi Shipyard, Nagasaki, launched the three-masted sailing barque *Tsukishima Maru*, 1,500 tons gross, with an auxiliary steam engine, for the Tokyo Higher Nautical School.

(2) In 1903, the Kawasaki Dockyard, Kobe, launched the four-masted sailing barque *Taisei Maru*, 2,200 tons gross, with auxiliary steam engines, for the same school. This ship was the substitute for *Tsukishima Maru* which had been missed in 1900.

(3) In 1923, the Mitsubishi Shipyard, Kobe, launched the four-masted sailing barkentine *Shintoku Maru*, 2,500 tons gross, with auxiliary steam engines, for the Kobe Higher Nautical School.

(4) By the end of this year (1929) or the beginning of next year (1930), the Kawasaki Dockyard, Kobe, will launch two ships for the Education Department. Both of them are to be four-masted sailing barques of 2,200 tons gross with auxiliary motor engines and are intended for the training of the boys of eleven local nautical schools.

Refrigerated Cargo Ships

In 1922 and 1923 the Yokohama Dockyard, Yokohama, launched the s.s. *Kaiko Maru* and six other ships, about 1,500 tons gross each, and in 1923 the Mitsubishi Shipyard, Nagasaki, launched the s.s. *Choko Maru*, 1,600 tons gross.

In the same period several other shipyards launched 15 ships of under 1,000 tons gross and also converted three other ships. They have since launched six small ships.

Carrying cargoes in the holds kept cold by refrigerating engines has developed quite recently in Japan, in addition to carrying fresh fish in the usual ice chambers of fishing boats and catches carriers. Such ships as mentioned above are specialized in carrying refrigerated cargoes which are frozen or fresh fish. Nearly 30 other Japanese large ships have a part of their holds refrigerated, carrying meat, fruits, etc. to and from Japan.

Fishing Boats

A great number of fishing boats, large and small, of all varieties, such as trawlers, whalers, drifters, long liners, different kinds of seine boats and angling boats, training ships, instruction ships, experiment ships, catches carrying ships, etc. were and are being built at several places around the coast. The recent rapid development of the fishing industry has been side by side with the building of numerous fishing boats with motors. At present the number of existing fishing boats with engines—most of them being motors—is about 20,000 including about 300 steel ships, and the number of existing fishing boats of five tons gross and upwards without engines is about 13,000.

As small wooden ships and small motors in the severe services of fishing have very short lives, they must be frequently replenished by building new ones. For this and for the steady expansion of the fishing enterprises, fishing boat builders are flourishing and many specialized motor builders are kept always busy.

Floating Canneries

Besides the building of new ships, it may be interesting to note that several cargo steamers and other steamers, about 2,000 or 3,000. tons gross each, have recently been converted and are employed as floating canneries at the very spots of catching crabs with seines in the open seas in the north of Japan, to produce the most fresh canned-flesh. This new enterprise employing large steamers as canneries in open sea, which is in addition to the usual land canneries along the coast of Kamchatka for the crab fishing near the coast, was started some eight years ago and employs about 16 cannery-steamers with a small motor vessel or two and a number of seine junks attached to each cannery-steamer, and a few catches carrying steam tenders of about 1,000 tons gross during the season every year and makes a great amount of products which are supplied everywhere, the exports for Europe and America being remarkable.

Cargo Ships

The building of cargo ships has been so numerous that we omit describing particular ships and say that, owing to the progress of the art of shipbuilding, new cargo ships are becoming more and more efficient and economical, reducing their weights, increasing their speeds and carrying capacities, being provided with innovated machineries of small fuel consumption, comfortable accommodations, bettered safety and improved equipments—especially cargo handling appliances—and having constructions adapted for specialized cargo carrying. Oil tankers and refrigerated cargo ships as mentioned before are the examples of specialized cargo ships. For another example it may be added here that the building of ships, mostly motor ships, with long holds, clear upper deck and special fittings adapted for lumber trade, has become remarkable owing to the specially increased supply of lumber from Hokkaido, Karafuto, Maritime Province of Siberia and the Pacific Coast of North America after the Japanese great earthquake of 1923.

The following list shows the cargo motor ships of 1,000 tons gross and upwards launched in Japan since 1924 besides those four oil tank motor ships already mentioned in *E* (3) and (5).

Name of Owners	*Name of cargo motor ship*	*Gross Tonnage*	*Launched at*	*in*
Mitsui Bussan Kaisha	*Akagisan Maru*	4,600	Mitsui Shipyard, Tama	1924
Kobe Steel Works	*Fukko Maru*	3,800	Harima Shipyard, Aioi	"
Kawasaki Kisen Kaisha	*Florida Maru*	5,800	Kawasaki Dockyard, Kobe	"
" " "	*Cuba Maru*	5,900	" " "	1926
Itaya Shosen Kaisha	*Yahiko Maru*	5,700	Harima Shipyard, Aioi	"
Mitsubishi Shoji Kaisha	*Columbia Maru*	5,600	Mitsubishi Dockyard, Nagasaki	1927
" " "	*Olympia Maru*	"	" " "	"
Yamamoto Shoji Kaisha	*Shunten Maru*	"	" " "	"
Mitsui Bussan Kaisha	*Koyasan Maru*	2,000	Mitsui Shipyard, Tama	"
" " "	*Tatsutasan Maru*	"	" " "	"
" " "	*Kuramasan Maru*	"	" " "	"
" " "	*Takamisan Maru*	"	" " "	1928
Shimatani Kisen Kaisha	*Taihei Maru*	6,200	" " "	"
Mitsui Bussan Kaisha	*Hakubasan Maru*	6,600	" " "	"
" " "	*Hakonesan Maru*	"	" " "	1929
Showa Shosen Kaisha	*Kowa Maru*	5,800	Uraga Dockyard, Uraga	"
Nippon Shokuyen Kaisha	*Hino Maru*	2,600	Mitsubishi Shipyard, Kobe	"
Tairen Kisen Kaisha	*Tenzan Maru* and three other ships	2,700 each	Mitsui Shipyard, Tama	"
Osaka Shosen Kaisha	*Sydney Maru*	5,300	Yokohama Dockyard, Yokohama	"

Besides those in the above list, the following cargo motor ships will be launched in the near future.

Name of Owners	*Number of cargo motor ships*	*Gross tonnage*	*at*	*in*
Osaka Shosen Kaisha	one	5,300	Yokohama Dockyard, Yokohama	1929
" " "	one	"	" " "	1930
" " "	four	8,300	Mitsubishi Shipyard, Nagasaki	"
Kishimoto-Kisen Kaisha	two	8,600	Yokohama Dockyard, Yokohama	"
Yamashita Kisen Kaisha	one	7,500	Uraga Dockyard, Uraga	"

TABLE I

The Annual Output of the Mercantile Shipbuilding in Japan

Ships of 100 tons gross and upwards launched in Japan.

Year	*Number*	*Gross Tonnage*	*Year*	*Number*	*Gross Tonnage*
1914	39	85,125	1922	57	71,076
1915	31	50,104	1923	56	74,284
1916	68	157,196	1924	39	71,440
1917	196	403,016	1925	33	55,086
1918	396	641,056	1926	27	51,303
1919	190	646,344	1927	35	52,473
1920	146	452,688	1928	48	109,058
1921	69	226,081			

Note.—Sailing ships are excluded, but the launching of large sailing ships has been very rare.

This Table tells how much Japanese shipyards contributed to fill the shortage of the world's tonnage during the European War. The maximum record was 646,300 tons in 1919 and it would have exceeded 1,000,000 tons if the supply of shipbuilding materials had been easily procured to let the shipyards work at full efficiency.

Before the War, Japanese private shipyards had built some gun-boats and merchant ships including light-house tenders, steam yachts, etc. for foreign countries in the Orient. During the War they exported about 70 newly built merchant steamers totalling 460,000 in gross tonnage, for Great Britain, United States, France, Norway, Italy, Spain, Denmark and Russia. The total export of merchant steamers, old and new, from Japan for those countries was about 200 in number and 560,000 in gross tonnage.

Last year (1928) Japanese launchings increased to 109,000 tons gross, taking fifth position in the world. Further, this year's figure will probably exceed 165,000 tons gross. However, this latest activity of the shipbuilding is not likely to continue, as it has been caused chiefly by a contingent concurrence of the replacements of the subsidized liners on the expiration of their age limits. Still the recent progressive tendency of building cargo motor ships is worthy of attention.

The Economical Conditions of the Mercantile Shipbuilding in Japan and the Governmental Policy for It.

The aggregate gross tonnage of Japanese merchant ships of 100 tons and upwards was 4,425,645 tons in June this year (1929). For several years the Japanese merchant shipping has been the third in tonnage among the world countries.

The normal position of the Japanese mercantile shipbuilding has been considerably lower than that of the Japanese shipping, that is to say, the shipbuilding has not been keeping pace with the shipping. This is chiefly due to the fact that while the shipbuilding is really a synthesizing industry in which practically all kinds of products of other industries are assembled together as the materials of ships, the development of other industries in this country has not been so perfectly harmonious as to give a satisfactory and adequate supply of materials to the shipbuilding industry and this industry has had to rely very much on the imports of materials with the unavoidable accretion of the import duties, freights, insurance premiums, and other charges, which is at least a handicap to the shipbuilding cost.

The subsidies given by the State for the mercantile shipbuilding under the Law of 1896 were intended to compensate for the above mentioned handicap and were, for ships built, Y.20 per gross ton and Y.5 per indicated horse power of machineries simultaneously built, the rate for hulls having been altered by 1909 and become Y.11 to 22 according to the class of ship and the criterion of service. This law, together with other laws for the subvention for shipping voyages discriminating foreign-built ships, had caused a remarkable increase of home-built passenger liners but had not been so effective as to induce any considerable output of cargo ships, and the annual launching of merchant ships had seldom exceeded 50,000 tons gross until the time of the European War, when a sudden shortage of the world's shipping tonnage urged the old and new shipyards in Japan, as well as in other countries, to produce a great many cargo ships, most of them standardized, with the result that the profits of the shipyards became so great and the burden on the State so increased that at last the subsidies were stopped in 1917 and ceased ever since.

While no measure was yet taken to substitute for the shipbuilding subsidy system the depression of the shipping and shipbuilding after the cessation of the War not only struck out most of the new shipyards but also afflicted even the well founded shipyards with over-expanded installations. Therefore in 1921 the present system of indirect encouragement of the shipbuilding was laid down. In this system the import duties on steel materials in general and the special equipments and machineries which are difficult to make in Japan are made free so far as they are used in building or repairing ships, and the home steel makers in their turns are to receive bounties of so much Yen pert on ofs teel materials of their make so far as they are used in building or repairing ships, the rates being equal to those of the import duties. Thus the disadvantage to the shipbuilding cost due to the import duties on such materials as mentioned above which mostly have to be imported from Europe has been relieved of, but there still remains the disadvantage due to the freights and other charges on those materials. We may add here that there is a disadvantage which is due to somewhat high overhead charges to be imposed on the shipbuilding cost in consequence of the general deficiency of orders as experienced in normal years.

Another indirect system for the encouragement of the shipbuilding at present is the subvention for four main Japan-America lines in which foreign built ships are prohibited to be employed except under special permission. However, for all other Japanese liners in the services by the Government orders including those under mail contracts there is no discrimination, wherever they may have been built.

Although the tonnage of Japanese shipping is in the third position among the world countries as mentioned already, it has been expanded largely with the imports of foreign second-hand cargo ships to the discouragement of the home shipbuilding, so that there are quite a number of old ships. Their replacement with new and efficient ones is hoped from the point of view of economy and safety but it is not an easy matter for many owners of insufficient means, who are the very owners of most of old ships in this country. Thereupon much was argued as to the necessity of a measure by the State to aid in breaking-up over-aged ships on condition that new ships are to be built here in substitution. Such a measure, whether in the form of bounties or in that of loans it may be, would be another desirable indirect system of encouraging the shipbuilding for the time being, but it has not been realized yet.

Formerly the customs duties on imported ships has been Y.15 per gross ton for ships not exceeding 10 years in age and Y.10 for ships exceeding 10 years. After the War these rates as well as those for all other commodities were reconsidered with a view to the entirely changed economical conditions. If then a policy to invigorate the shipbuilding had been introduced or if, at least, the rates had been generally increased in proportion to the average rise of the prices of commodities, the rates would have become so high that the shipping interest would have suffered too much even in the cases of the imports of young ships. So that in 1926, with an intention to suppress the import of old ships, the rates were revised to Y.15 for ships not exceeding 20 years in age and Y.20 for ships exceeding 20 years. Since this revision, there has been almost no import of very old ships except for breaking-up purposes.

Before the War, the wages of Japanese shipyard workers were very low, but now they are earning as high wages as in the time of the War, as shown at the bottom of the following Table II. Still now, their wage rates are considerably lower than those in other chief shipbuilding countries, but this advantage to the shipbuilding cost is nearly counterbalanced by the inefficiency of labor owing mainly to the fact that very often materials can not be acquired in good order so as to meet the progress of works and a number of idle workers are usually kept employed even while shipbuilding orders are short as it is difficult to replenish skilled ones when required.

Shipbuilding Yards and Ship Repairing Docks in Japan

The following table shows the changes of conditions of the Japanese private shipyards which can build merchant ships of 1,000 tons gross and upwards, before, in and after the European War.

TABLE II

Year	1913	1918	1928
No. of firms	5	53 including 12 firms for building wooden ships	18
	About	About	About
Authorized capital ...	Y.25,550,000	Y.162,050,000	Y.235,950,000
Paid-up capital	23,150,000	22,000,000	104,659,000
Debentures	3,600,000	22,000,000	104,659,000
No. of yards for building ships of 1,000 tons gross and upwards ...	6	57 including 12 yards for building wooden ships	21
No. of berths for building ships of 1,000 tons gross and upwards ...	17	157 including 22 berths for building wooden ships	75
No. of dry docks for repairing ships of 1,000 tons gross and upwards	30	37	45
No. of workmen (contingent laborers excluded)	26,100	107,200	40,400
No. of other persons permanently employed	?	7,300	5,800
Regular daily working hours	Mostly 10 hours	Mostly 10 hours	Nearly half of yards 8 hours, about half of yards 9 hours and a few yards 9½ hours.
Average daily wage earning of a workman ...	Y.0.97 (1914)	Y.2.17 (1918) Y.2.75 (1919)	Y.2.81

Most of the firms perform shipbuilding, ship-repairing and certain other works, and the figures given are for the whole works. The extraordinary numbers, of shipbuilding firms, yards and berths in the war time were due to the contingent establishment of numerous small yards, most of which vanished after the War. At present, there are 22 private shipyards which can build merchant ships of 1,000 tons gross and upwards.

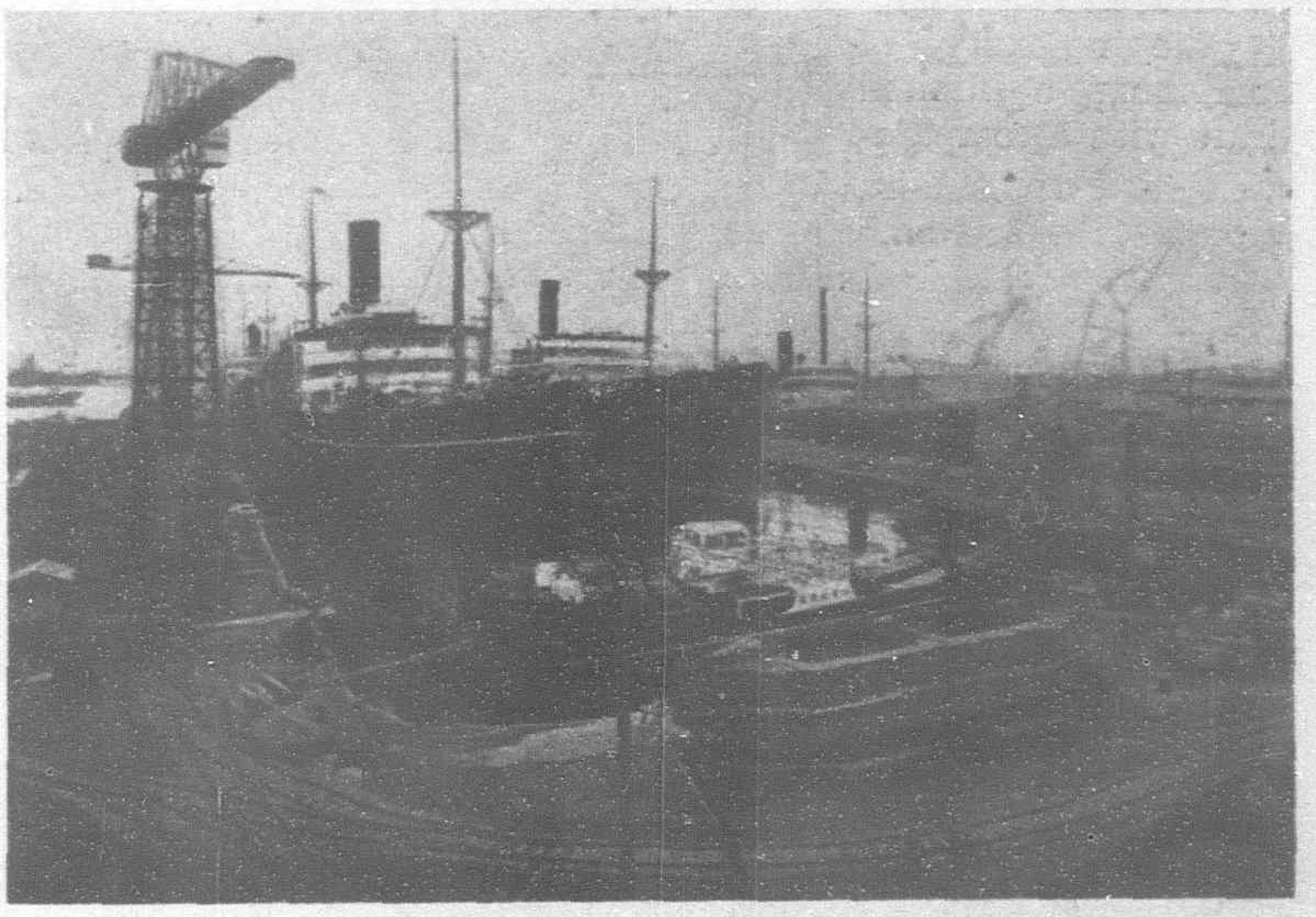
The principal private shipyards are as shown below in which only dry docks not shorter than 350 feet, 29 in total number, are given, while in this country there are 46 more dry docks of shorter lengths and about 180 slipways for mercantile ship-repairing.

TABLE III

Name of firm	*Situation of Shipyard*	*Dry docks*
Mitsubishi Shipbuilding Co., Ltd. ...	Nagasaki	728-ft. 523 „ 375 „
	Kobe	16,000 ton* 12,000 ton* 7,000 ton*
	Hikoshima, near Moji	460-ft. 369 „
Kawasaki Dockyard, Ltd.	Kobe	428 „
	Osaka	476 „ 438 „
Osaka Iron Works, Ltd.	Innoshima	469 „ 407 „ 355 „
	Kasadojima, near Hiroshima	470 „ 365 „
Yokohama Dock Co., Ltd.	Yokohama	640 „ 495 „ 400 „
Asano Shipyard, Ltd.	Yokohama	659 „ 497 „
Uraga Dock Co., Ltd.	Uraga, near Yokohama	497 „ 456 „
Harima Shipyard of Kobe Steel Works, Ltd....	Aioi, near Kobe	420 „
Mitsui Shipyard of Mitsui Bussan Kaisha, Ltd.	Tama, near Okayama	485 „ 350 „
Fujinagata Shipyard, Ltd.	Osaka	483 „
Ishikawajima Shipyard, Ltd. ...	Tokyo	
Hakodate Dock Co., Ltd.	Hakodate	531 „
Mukaijima Dock Co., Ltd. (repair works only)	Mukaijima, near Onomichi	410 „

A General View of the Yokohama Dockyard Company

The Yokohama works of the Yokohama Dockyard Company is located just near the Sakuragi station of Yokohama city. It was founded in 1882, but it was in and after 1917 that the company started building ships, as it was previously engaged in the repairs of ships and general iron works enterprise, as well as warehouse undertakings. It has been fully restored from the damage that it severely suffered at the earthquake calamity of 1923. To-day, its speciality is, in addition to the shipbuilding, the manufacture of boilers, paper manufacturing machinery, and gas manufacturing machinery. The N.Y.K.'s San Francisco liner *Chichibu Maru* and its Seattle liner the *Hikawa Maru* and the *Hiye Maru* were built by this company. The picture was taken by the staff photographer of the Kaizosha for its Japan Geographic System.



Yokohama Dockyard Company

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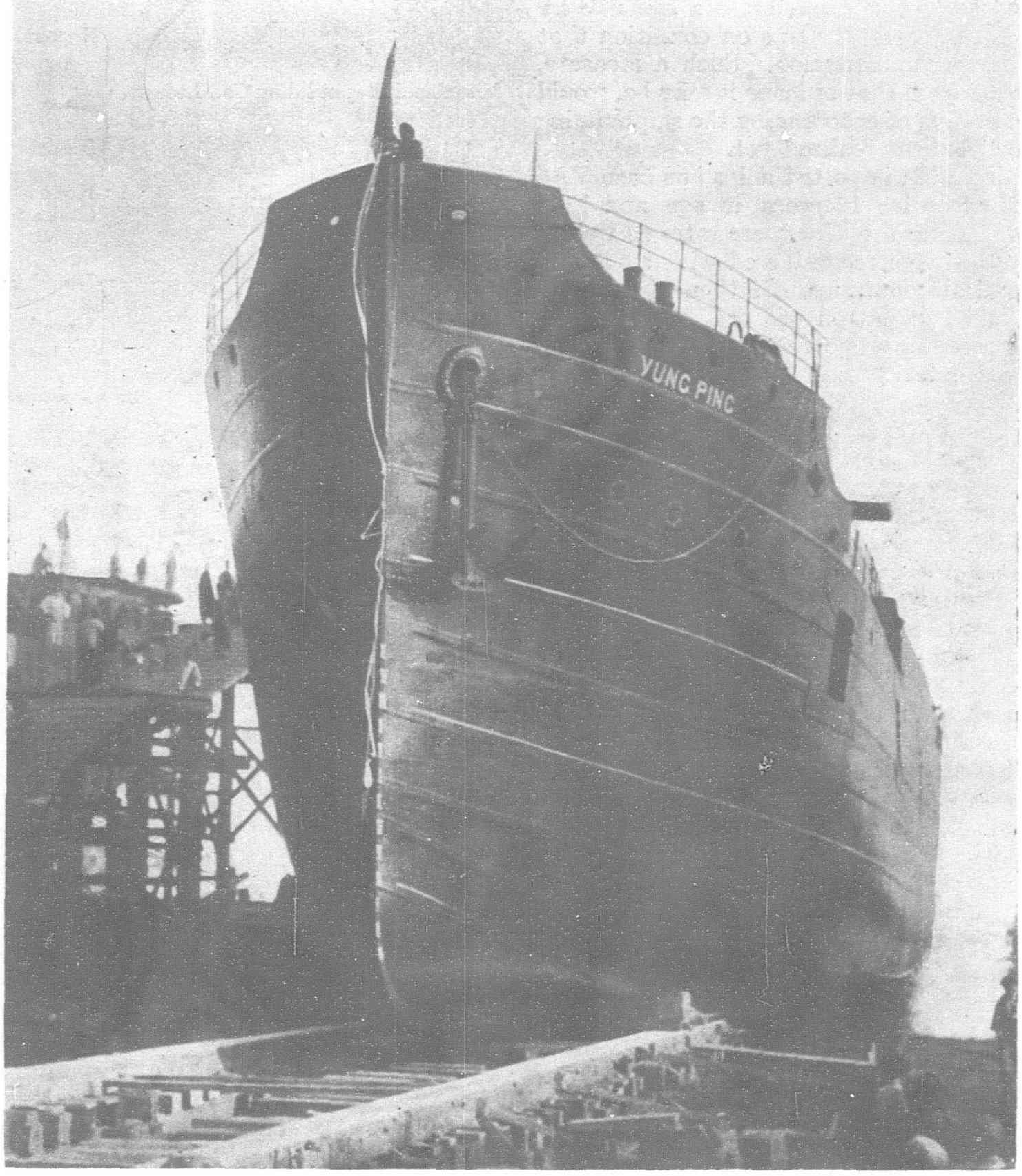
*Floating Dock.

The Motor Vessel "Yungping"

The motor vessel *Yungping*, which was built by La Société Franco-Chinoise de Constructions Metalliques et Mecaniques to the order of the Ta Tsing Navigation Co. for their Shanghai-Haichow service, was successfully launched at the Kiousin Dock in Shanghai.

The *Yungping* is a twin-screw vessel of the intermediate type, 230 ft. long and 35 ft. wide, but does not exceed a draft of 11 ft. when fully loaded. She is driven by two Diesel motors M.A.N. of 500 horse-power each and is capable of attaining a speed of 11 knots. The vessel has been built especially for the Haichow traffic, regarding which special studies of requirements had previously been made, and she has accommodation for eight first-class; 25 second and 30 third-class passengers. The difficulties in her construction lie mainly in the necessity of combining a limited draft with a comparatively heavy deadweight load.



The Launching of the "Yungping"

The *Yungping* is propelled by two M.A.N. solid-injection Diesel engines, in 7-cylinder arrangement, having an output of 410 h.p. at 375 r.p.m. The main engines are direct reversible by means of compressed air.

The main engines are the well-known trunk-piston, tie-rod types of the M.A.N. Of the many good features of the M.A.N. this tie-rod construction is one of the most remarkable.

Tie-rods, made of high-grade steel, reach from the top of the cylinder down to the cross girders of the crank case (Fig. 2). These tie-rods are installed during erection of the engine, and are given an initial stress, in order to relieve all stress upon the casting of the engine resulting from compression and combustion in the cylinder. This fact not only is an assurance for the solidity of the construction, but it allows also, at the same time,

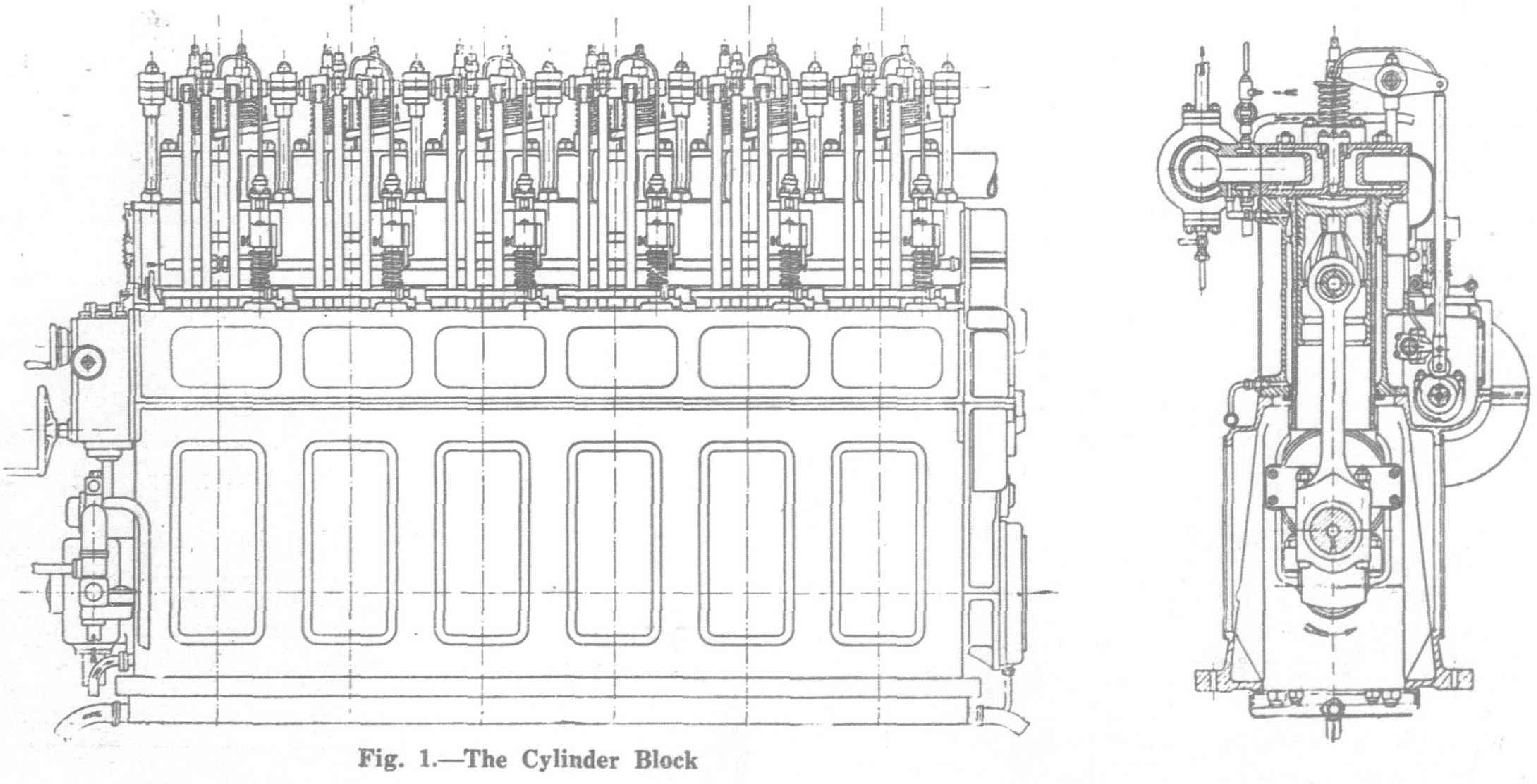
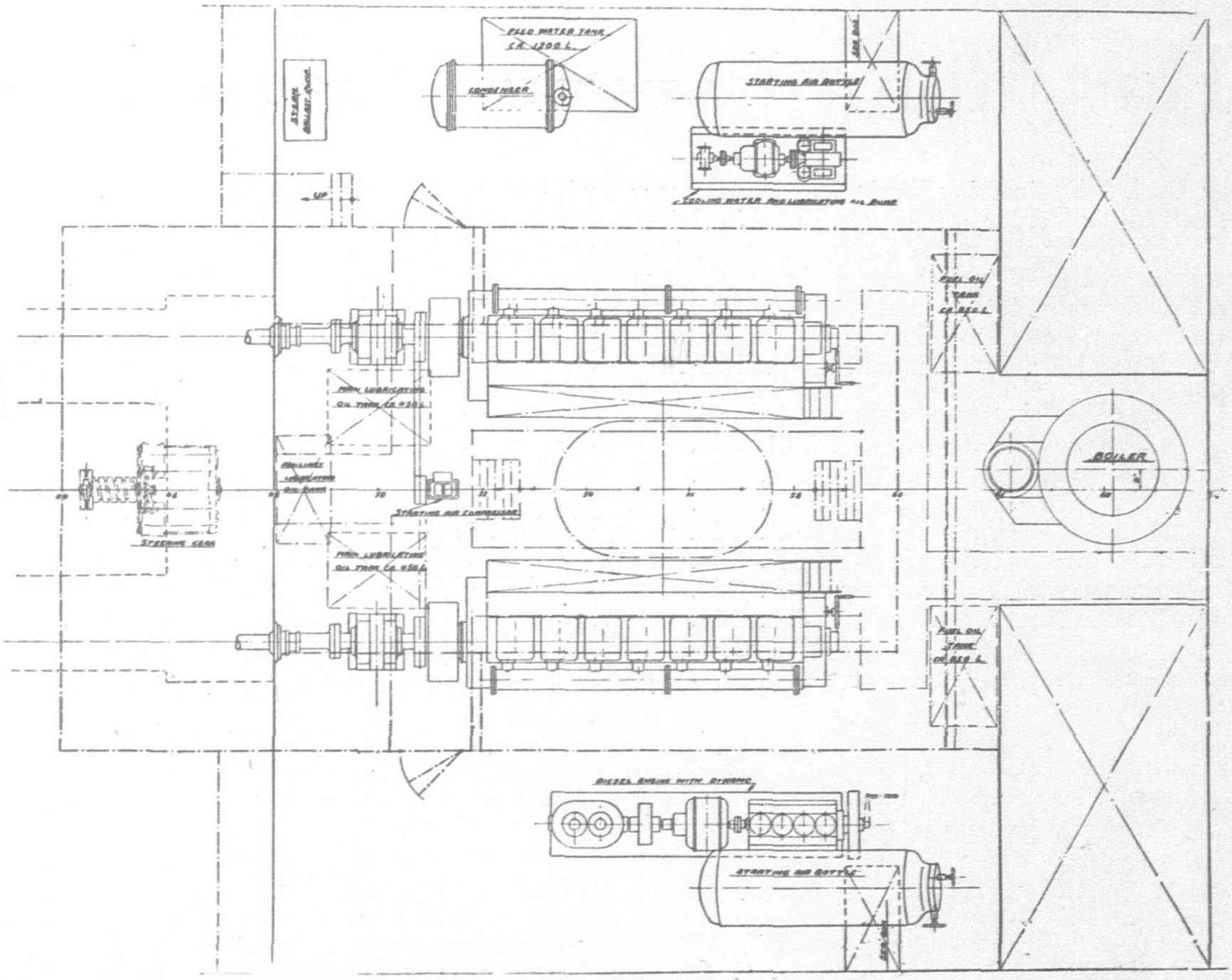


Fig. 1.—The Cylinder Block


FEED WATER TANK CA. 1200 L.
CONDENSER
STARTING AIR BOTTLE
COOLING WATER AND LUBRICATING OIL PUMP
UP
FUEL OIL TANK
MAIN LUBRICATING OIL TANK CA. 450 L.
STARTING AIR COMPRESSOR
STEERING GEAR
BOILER
DIESEL ENGINE WITH DYNAMO
STARTING AIR BOTTLE

Arrangement of the "Yungping" Engine Room

to prepare large openings in the motor crank case, thus rendering the running gear very easily accessible (Fig. 3). This fact is most important with marine installations. The block construction of the cylinders gives the engines a rigidness and stiffness most important in marine installations. The construction of the bed-plate of the engines has been made with a view in mind, to allow the length girders of the engine-seating to go through the length of the ship, uncut by the flywheel of the engine. This fact increases the stiffness and rigidity of the ship's frame. The cranks of the engines are set at angles which insure proper balancing of all moveable parts. Every cylinder has its own cylinder liner inserted into the cylinder block. This liner can be dismantled within a very short time, and very easily (Fig. 1).

The reversing gear of the engine is operated either by hand or by compressed air. The cam shaft has two rows of cams, one for forward and one for astern. During the operation of reversing, or in case of incorrect operations of the reversing gear, all parts of the reversing gear and the starting gear are interlocked in such a way that faulty operation is impossible. This feature makes the motors "fool proof" insamuch as they cannot be started unless the reversing operation is correctly and completely executed by the operator. The reversing itself takes only a few seconds. The starting valves in the cylinders are automatically working; the compressed air for starting is automatically shut off as soon as the fuel in the cylinder is ignited. This fact insures economy in the starting air.

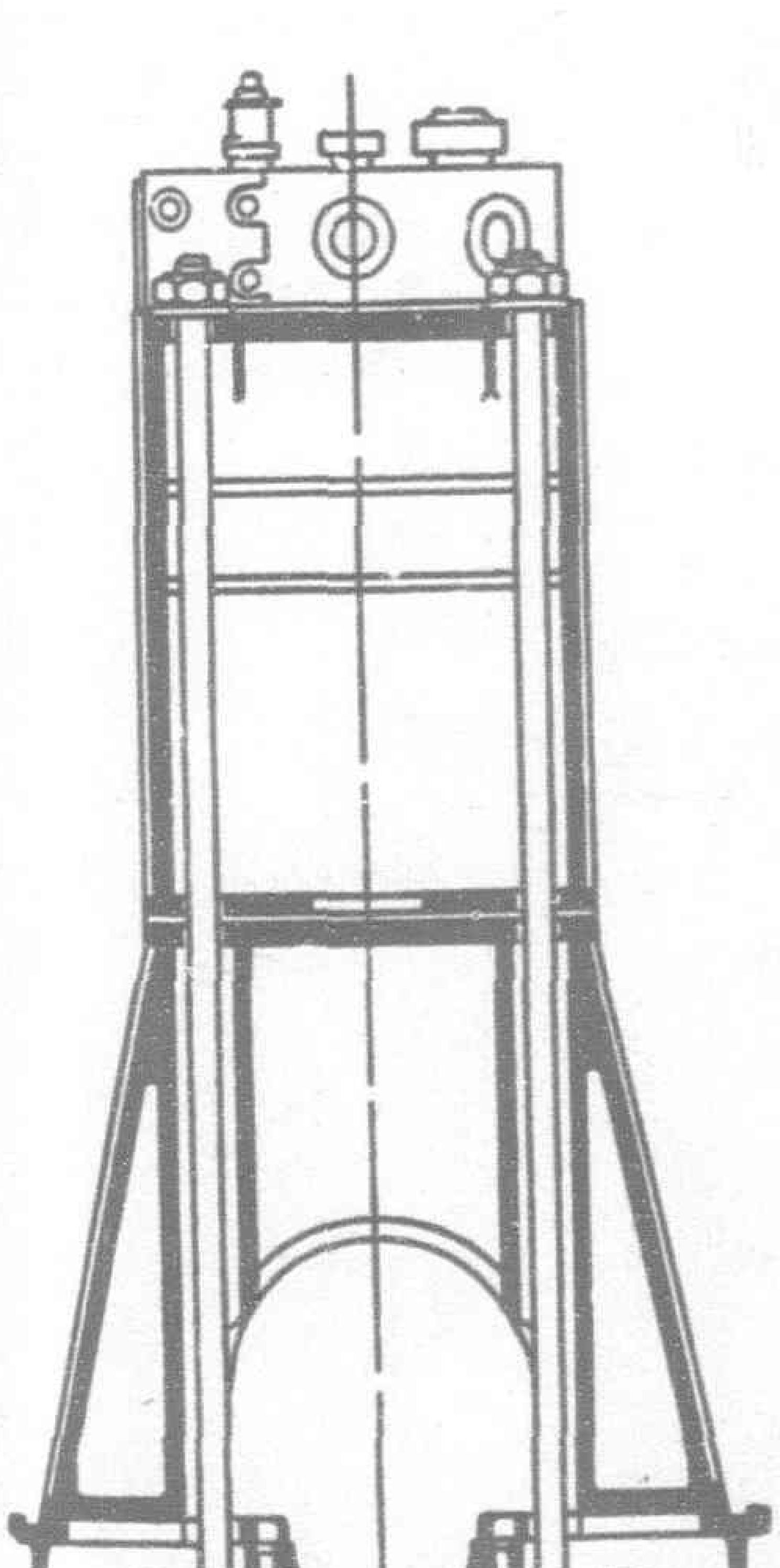


Fig. 2.—Tie-Rods

The fuel nozzles (Fig. 4). of the engines have no moveable parts whatsoever. Nothing is subject to wear and tear. The nozzles are, furthermore, water-cooled, and thus are giving a safeguard against the sedimentation of coke, if using lower-grade fuels. It is a matter of course that these engines are cold-starting, without any preheating or ignition devices.

The forced-feed lubricating system drovides all important moveable parts with the proper amount of lubricating-oil, so that very little care need be taken for this purpose. Needless to say, filters are installed into the circulating water, fuel oil, and lubricating oil lines. The auxiliary machinery consists of:

One auxiliary set, consisting of:

One 3-cylinder, 32 HP Diesel engine.

One 15 kW. dynamo.

One 40 cbm. hr two stage auxiliary air compressor.

All three parts are mounted on one common bed-plate and direct connected. The air compressor is supplying the air for manoeuvring and starting, pumping the air into two air vessels at a pressure of 450 lbs. per sq. in

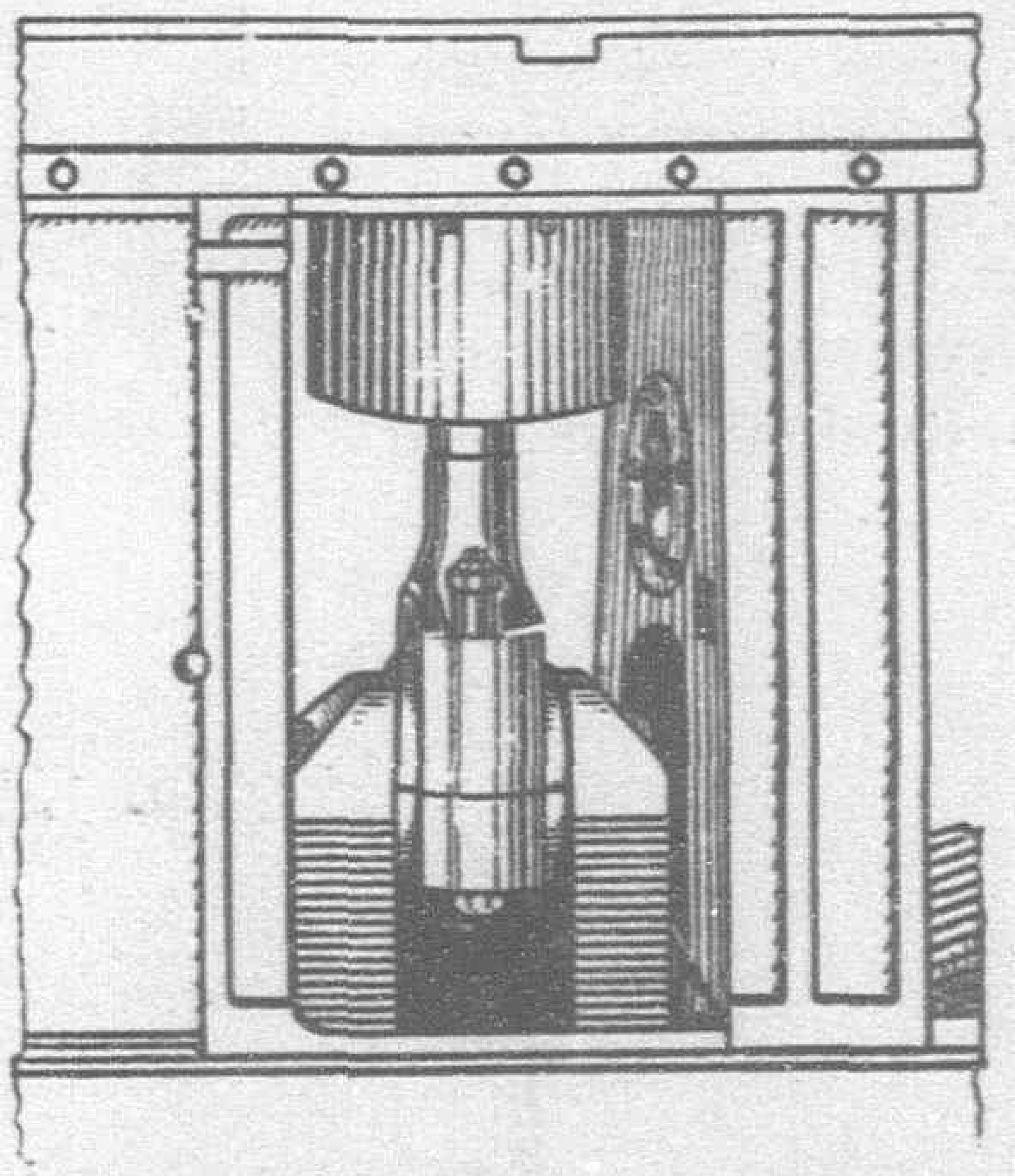


Fig. 3.—The Motor Crank Case

One pumping set, consisting of

One plunger type stand-by cooling water pump, and

One gear type stand-by lubricating oil pump.

The bilge, cooling water and lubricating oil pumps, driven directly off engines, are interconnected, and can be used for either engine alone or in connection with the stand-by pumps.

The deck machinery, anchor winches and steering engines are steam driven, the steam being supplied from a Cochran boiler.

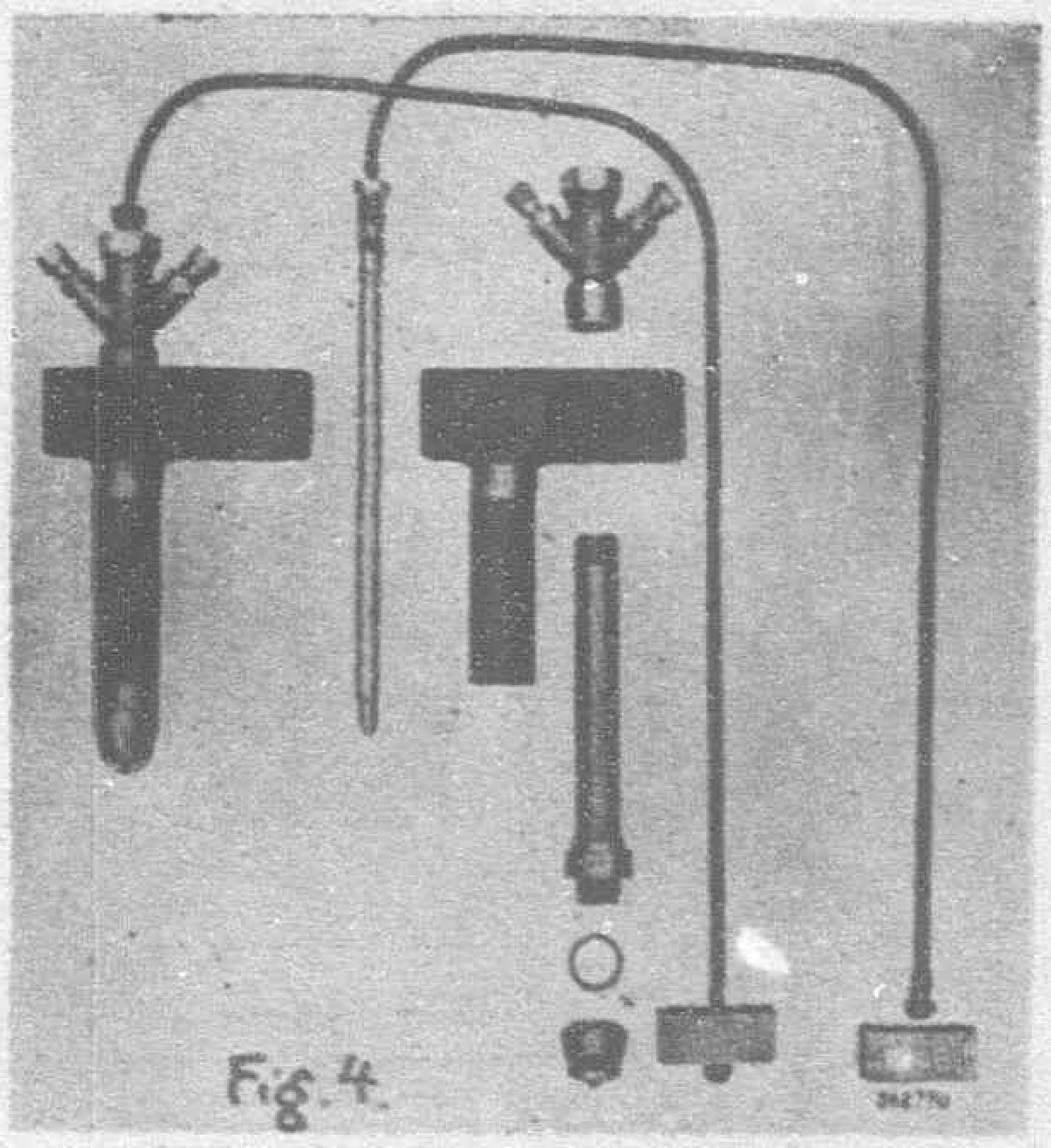


Fig. 4.—The Fuel Nozzles

The "Loyang Maru"

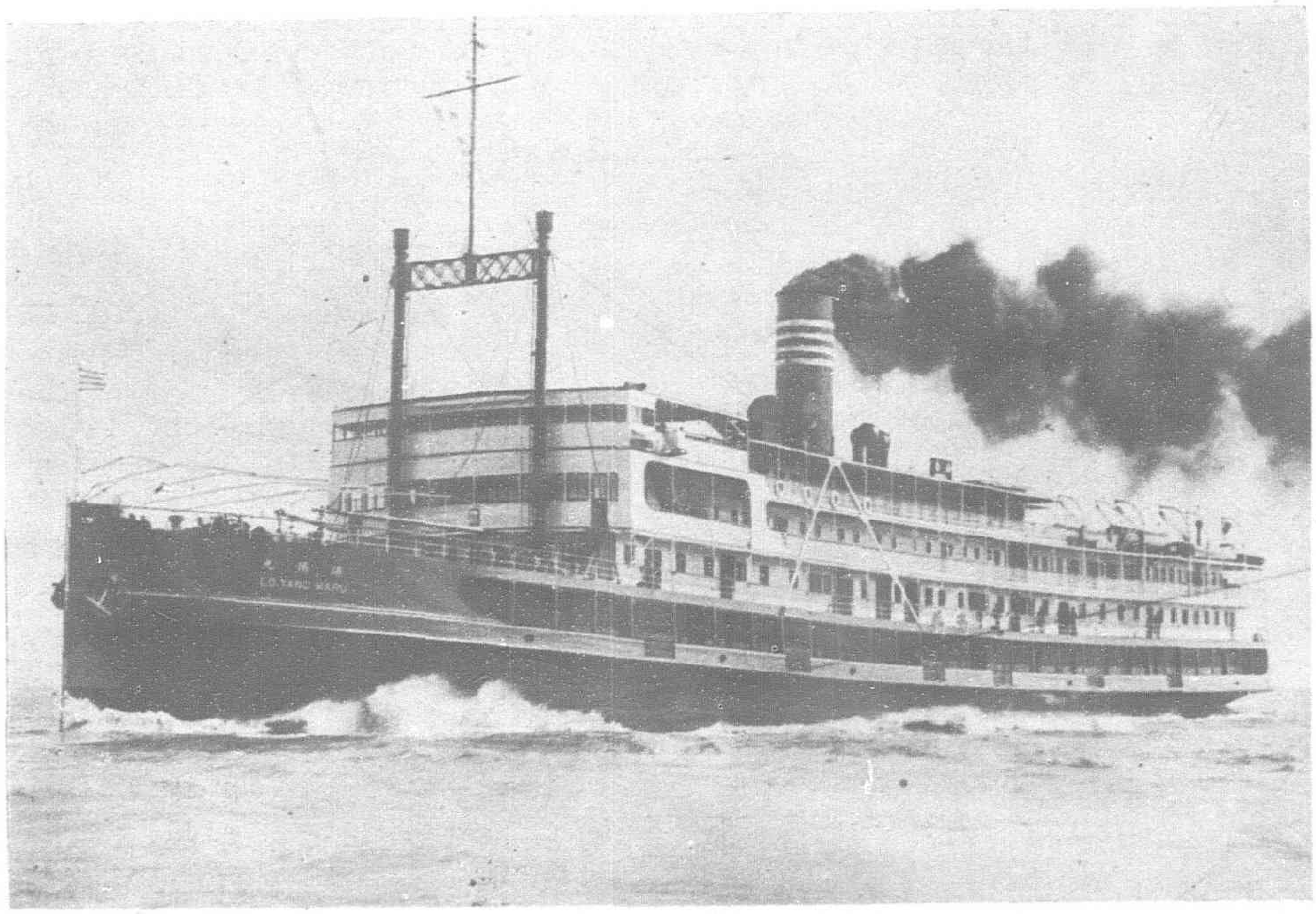
The Kiangnan Dock & Engineering Works built the steamer *Loyang Maru* to the order of Messrs. Nisshin Kisen Kaisha of Japan, the largest vessel in gross tonnage that has been constructed in Shanghai, expressly for the run between Shanghai and Hankow and intermediate ports. The vessel represents the combined experience of the Company's Superintendents, Captain K. Takeshita and Mr. Susukida and the Builders.

The Principal Dimensions are :—

Length overall	342-ft. 0-in.
Length between perpendiculars	330-ft. 0-in.
Breadth moulded	48-ft. 0-in.
Breadth over guards	59-ft. 0-in.
Depth to Upper Deck	24-ft. 3-in.
Height Upper to Promenade Deck ...	8-ft. 0-in.
Height Promenade Deck to Boat Deck ...	8-ft. 0-in.
Guaranteed Speed	15 Knots
Indicated Horse Power	3,300

The vessel has been designed for service on the Yangtze River as a first class passenger and cargo steamer. The hull is constructed of mild steel plates and sections tested to the requirements of the Tenshinsho Rules and the British Corporation and has been built under the Special Survey carried out by the Surveyors of these Classification Societies. Broad sponsons are fitted along both sides of main deck and vessel has a straight stem and elliptical stern.

A center lattice girder is fitted fore and aft, with six transverse watertight bulkheads, main and upper decks are complete steel decks with wood sheathing where necessary. Promenade, Boat and Shade Decks are a combination of stringer and tie plates with wood sheathing covered with painted canvas laid over felt. The upper deck forward is sheathed with teak.


"Loyang Maru"

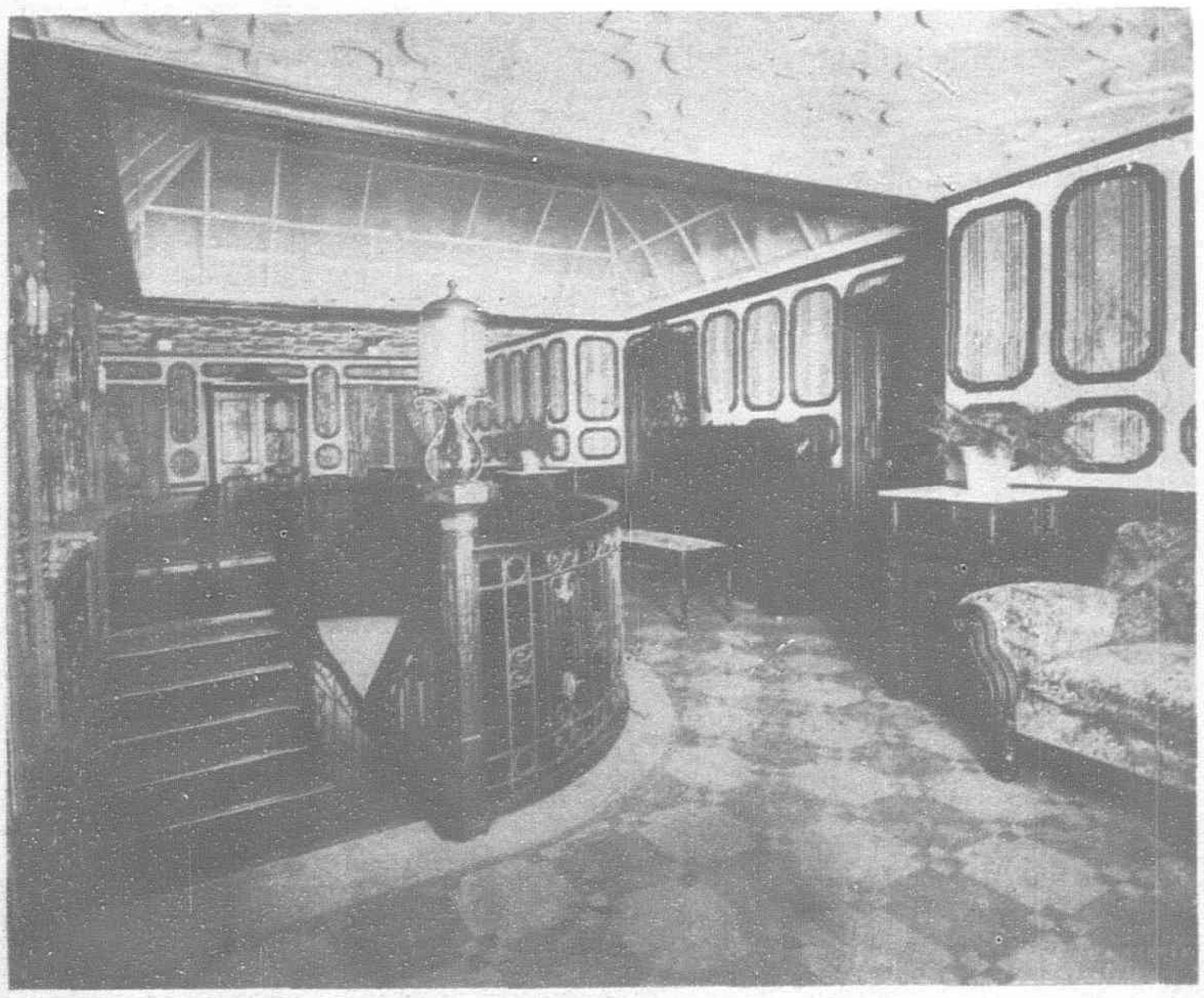
Passenger cabins are arranged or Upper Deck for 32 first class passengers, 38 second class and 172 third class. Cabins are arranged on Promenade Deck for 20 foreign first class passengers, and 10 foreign second class passengers, also cabins for pilots and officers.

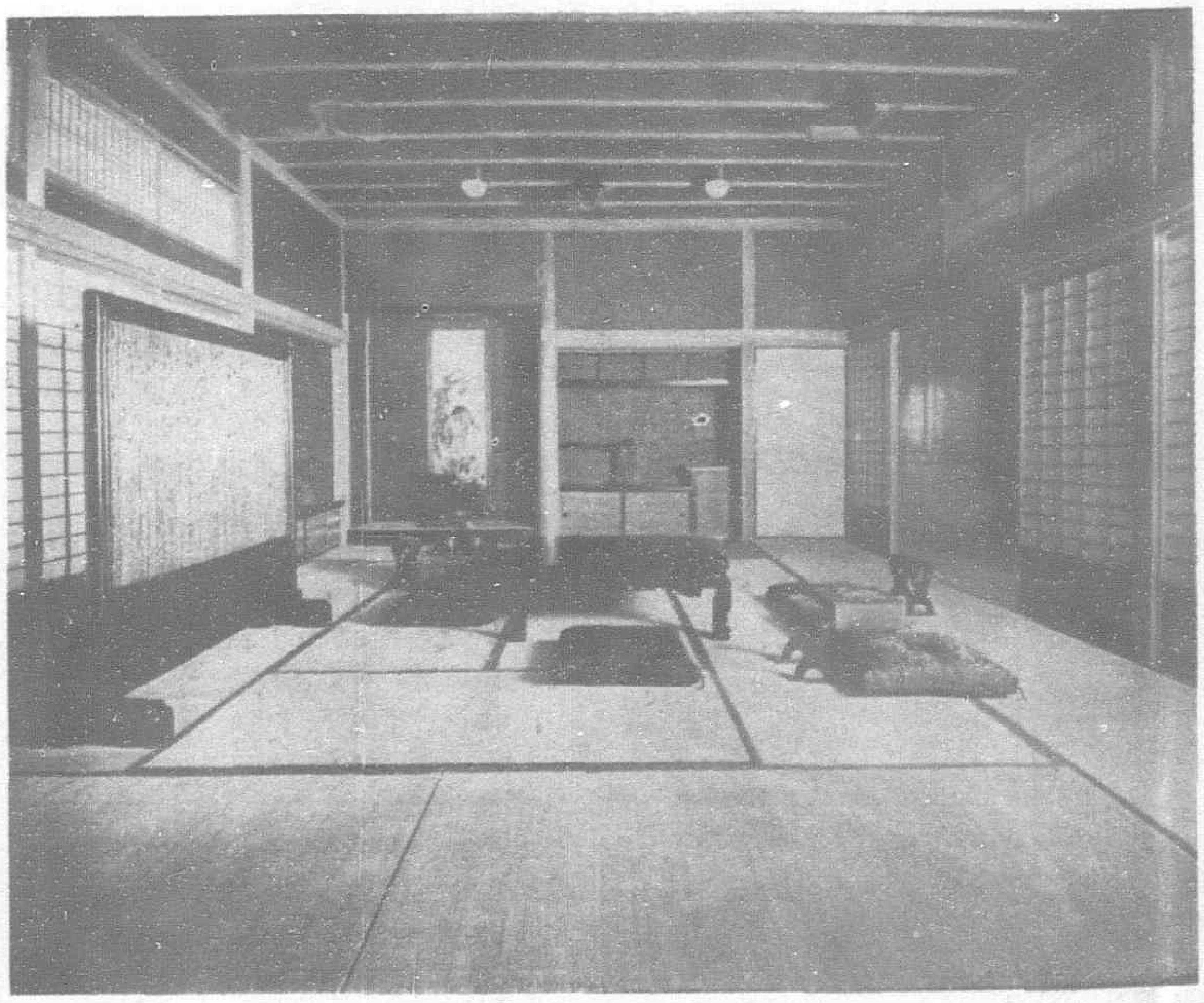
Captain's cabin and wheelhouse, Smoking Room, Palm House Cafe, Lounge and Japanese Social Hall are constructed on Boat Deck. A steel mast is fitted forward with one 10-ton derrick and two 5-ton derricks of steel tubes, with steam winches for the quick handling of heavy weights.

The *Loyang Maru* is driven by twin screws whose shafts are operated by two engines of the inverted direct acting triple expansion surface condensing type, turning outwards when running ahead and working on three cranks with cylinders and slide valve arranged in fore and aft line. Condenser is of the "Uniflux" type common to both engines. Air, feed and bilge pumps are driven by levers off the main engines. Three Scotch boilers fitted with Howdens forced draught working at a pressure of 200 lbs. per square inch supply ample steam to develop about 3,300 I.H.P.

Electric light is fitted throughout and current is supplied to fans, lights, electric heaters by two steam driven dynamos one of 27 k.W. and the other 15 k.W.

The steam windlass and capstan is of Emerson & Walkers latest design. The steam steering gear is placed directly over the rudderstock in steel


The Foyer


The Japanese Room

house and is of Donkin's latest type with telemotor gear and standard on navigating bridge.

The Dining Saloon will be finished in a fashionable and artistic manner, the side wall panellings are of five-ply oak teak frames, the upper parts of which are covered with silk. The ceilings are panelled in five-ply brick enamelled white. The fire place is of solid teak with marble hearth set in the center with special " Magicoal " electric fire by the General Electric Co. of China. An imitation coal fire giving a realistic flame and smoke effect throwing out considerable heat. The upholstery is in harmony of color and good taste.

The Lounge and Music Room in design is a combination of modern and ancient classical style. The upper part of the panelling is of birch and covered with Damask tapestry and the lower panelling is of birch with teak frames painted in white enamel for lighting effect. Overhead is a large dome skylight finished in stained leaded glass with flower design. Round this dome is arranged soft concealed strip lighting which will give a very pleasing effect. To eliminate noise the floor is covered with colored " Rublino." The room is fitted with a grand piano, easy chairs, settees, card tables, writing desk and small chairs. A refreshment bar is arranged adjacent.

The main stairway to First Class Saloon is of specially selected teak, with two Grecian " Pegasus " carved on the main pilasters. A clock in suitable carved panelling surmount a specially selected picture by a famous Japanese artist, completes the design.

The Smoking Room is a reproduction of the Elizabethan period. The walls are panelled in teak with characteristic doors having silver plated mountings. The ceilings are panelled in birch and teak. The windows are large oblong " Grittal " windows. Four angular cosy corners are arranged in the room and mahjong tables are fitted in each. Historical shields are worked into the design of the panellings. A teak fire place in keeping with the period encloses a marble hearth and an electric imitation coal fire. This floor is also covered with delicate colored " Rublino," and due regard has been paid to the comfort of passengers in the provision of settees and easy chairs. A leaded glass dome is fitted to this room from the center of which hangs a beautiful bronze chandelier with electric candles giving a soft effect to the whole. Ceiling fans are fitted throughout the accommodation.

The Japanese Social Hall situated on the Boat Deck is designed by a Japanese Architect and the special timber materials were imported from Japan. The floor is laid with 15 Tatami. The room is fitted with Tokonoma Chigaidana and Shoin.

Norwegian Shipping Progress in the Far East

THE shipping and commerce of Norway have lately been increasing by leaps and bounds, but nowhere has its increase been more rapid than in the Far East. Norwegian vessels are to be found wherever the water is navigable, and an increasing number of them are being stationed in Eastern, particularly Chinese, waters permanently, where they are earning a prosperous livelihood.

Some idea of the immense growth of the Norwegian mercantile marine during recent years can be obtained from a recent statement of H. M. Wrangell, president of the Norwegian Shipowners' Association. Mr. Wrangell declared that while the tonnage employed on services between Norway and abroad has remained almost unchanged during recent years, fluctuating round about 500,000 tons, the tonnage so employed between foreign ports alone increased during the year by 90,000 tons gross, and now consists of about 100 vessels of 372,000 tons gross.

Comparatively, Norway has the most modern merchant fleet in the world. During the year it was increased by over 300,000 gross tons, mostly new vessels, and on December 1 the fleet consisted of 1,860 vessels, of 3,300,000 tons. Of these 1,540, of 2,318,400 tons, were steamers, 309, of 981,640 tons, were motorships, and 11, of 4,320 tons, were sailing vessels. In the first 11 months of 1929 the steamer fleet increased by 142 vessels and 130,000 tons gross, and motorships by 170,000 tons. There is only one large sailing vessel left and she has been held up for a long while.

According to the Norske Veritas, the Norwegian tanker fleet now consists of over 100 vessels, of over 600,000 tons gross, while in addition there are 35 whale-oil refineries and transport vessels, of a total of 230,000 tons. More than half of this fleet has been acquired during the last three or four years, and the increase is evidently going to continue, for on December 1 there were 63 motor tankers, of 472,750 tons gross, under construction or on order for Norwegian owners. In addition, 25 steamers, of 45,600 tons gross, and 37 ordinary motorships, of 158,500 tons gross, were on order for Norwegian account—of which 17 were steamers, of 25,600 tons, and 10 motorships, of 28,460 tons—at Norwegian yards.

Soon after writing the above news was received of the decision of the Norwegian firm of Klaveness & Co. to start a new line in the near future between the American Pacific ports and Java and Sumatra. The ports to be called at are Shanghai, Hong Kong, Singapore, Penang, Belawan, and *via* the southern coast of Sumatra, Java, Macassar, and Balik Papan, from which the ships will proceed directly to America. As a provisional arrangement, the service to North China will be combined with that to the Dutch East Indies. It is intended to maintain the service between America and India with five new motorships, each of 9,000 deadweight tons. The owners of the new line will not be members of the Dutch East Indian Freight Conference, so that keen competition is expected with the Dutch Java-Pacific Line.

Mr. MacGouch, the representative of the American-Danish group, which, among others, works the Maersk line, recently paid a visit to Soerabaya in connection with his company's plan definitely to establish a new line between Java and New York. By way of experiment the company has been operating ships on this route for a year past by means of a monthly service as a minimum.

The Maersk line is not bound by any mutual agreement in the matter of minimum freights on this route, and its owners are said, after a consideration of the markets, to have reached the conclusion that through the introduction of lower rates an increase in the traffic may be expected which will yield larger profits than at the present time.

The Chinese Coastal Ship "Hai Hing"

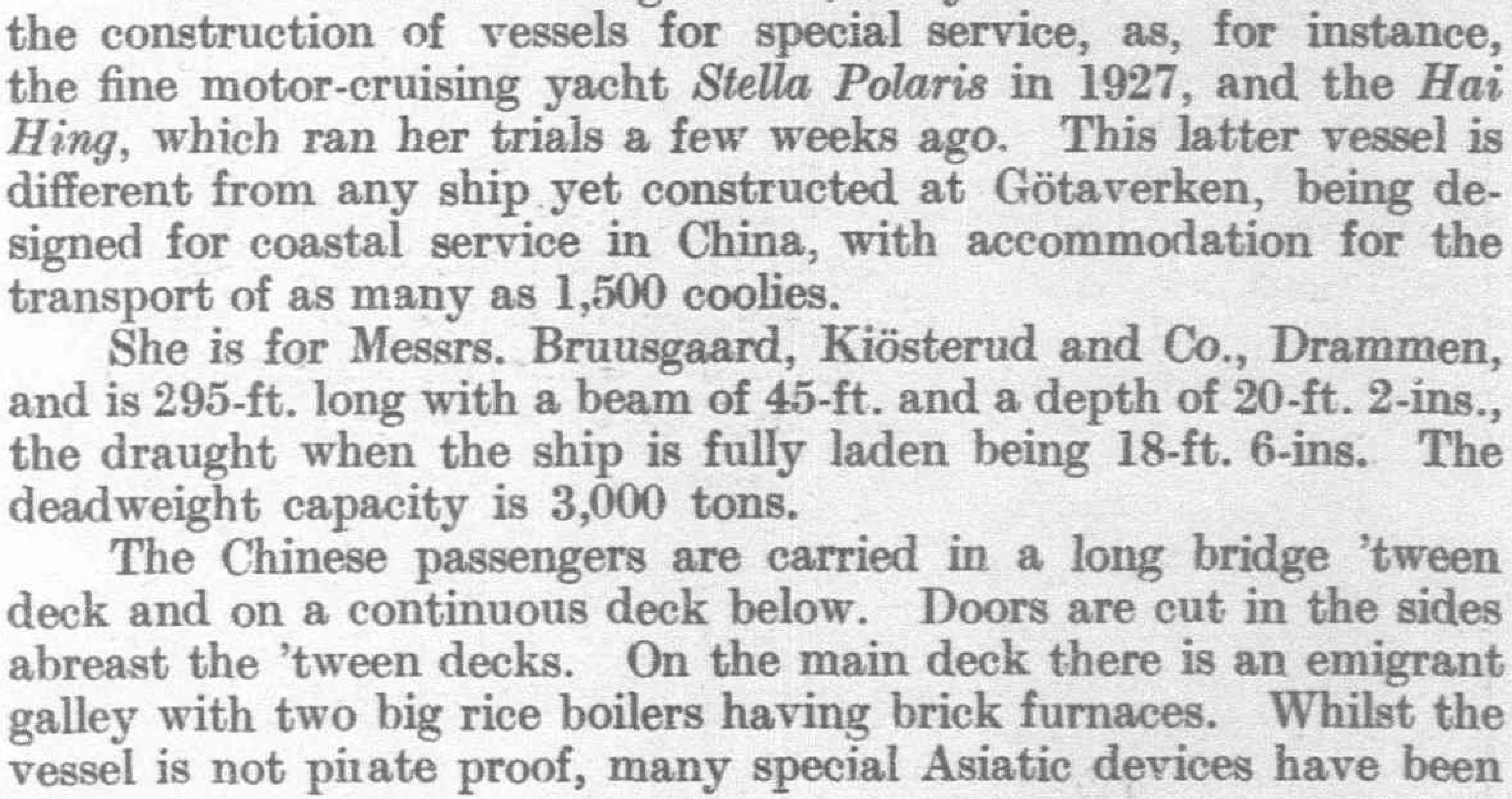
WHILST Götaverken some time ago took the step of specializing in tanker construction and later introduced standard types of motor tankers and cargo liners, the yard has also undertaken the construction of vessels for special service, as, for instance, the fine motor-cruising yacht *Stella Polaris* in 1927, and the *Hai Hing*, which ran her trials a few weeks ago. This latter vessel is different from any ship yet constructed at Götaverken, being designed for coastal service in China, with accommodation for the transport of as many as 1,500 coolies.

She is for Messrs. Bruusgaard, Kiösterud and Co., Drammen, and is 295-ft. long with a beam of 45-ft. and a depth of 20-ft. 2-ins., the draught when the ship is fully laden being 18-ft. 6-ins. The deadweight capacity is 3,000 tons.

The Chinese passengers are carried in a long bridge 'tween deck and on a continuous deck below. Doors are cut in the sides abreast the 'tween decks. On the main deck there is an emigrant galley with two big rice boilers having brick furnaces. Whilst the vessel is not pirate proof, many special Asiatic devices have been adopted.

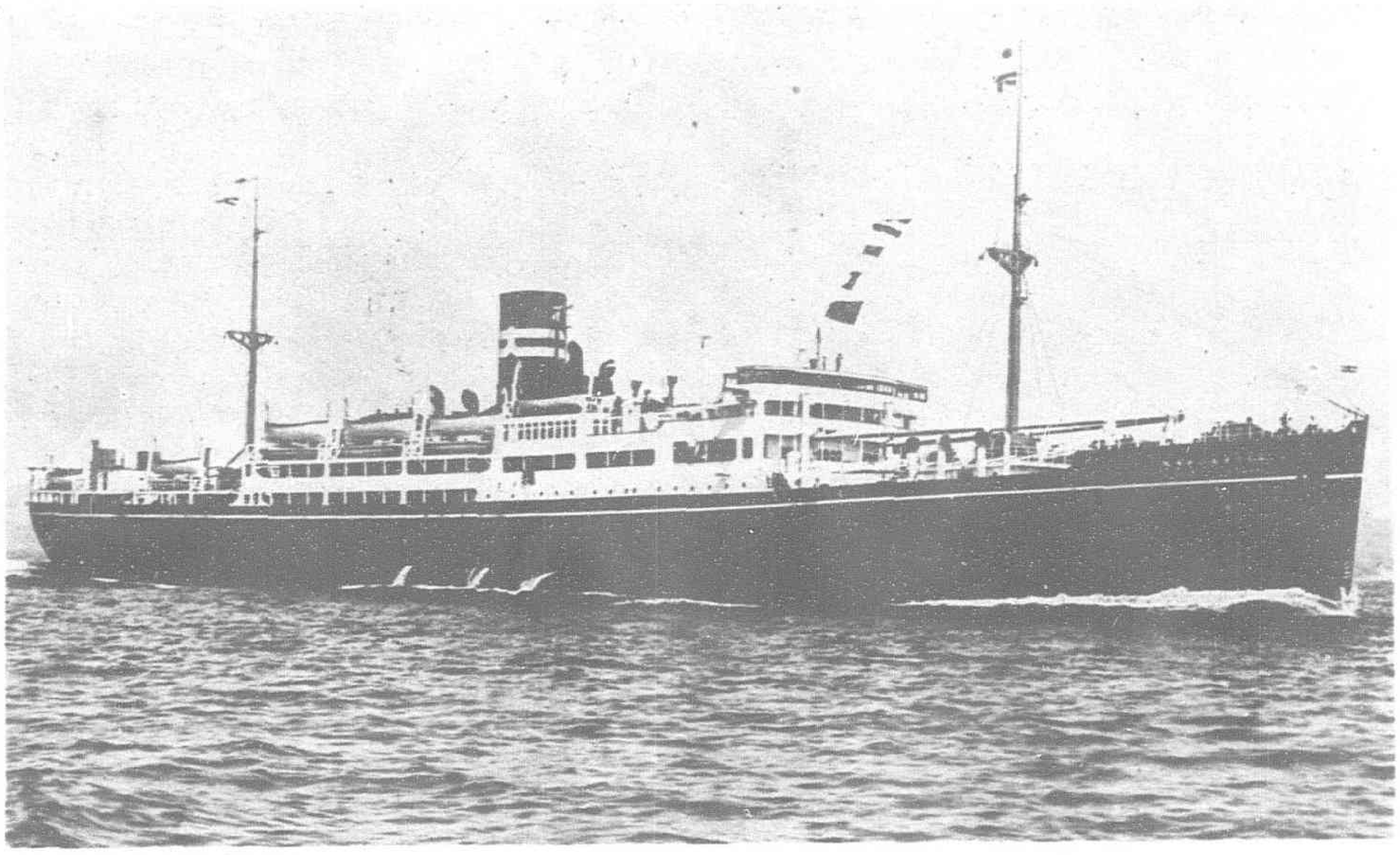
The propelling machinery comprises two Götaverken-B. and W. trunk-piston engines, each developing 1,750 i.h.p. There are two Diesel-driven generators, each of 58 kW., and electric power is used for heating purposes. An emergency generating set for lighting and wireless is located on the main deck close to the engine-room.

On trials, with 700 tons of ballast aboard, and with a mean draught of 10-ft. 8½-ins., a mean speed of 14.95 knots was attained with thee ngines developing 3,400 i.h.p. A maximum speed of 15.32 knots was recorded. After the trials, the Chinese crew was shipped and the *Hai Hing* left for Rotterdam to take in cargo for Java.



The "Hai Hing"

New O.S.K. Liner "Buenos Aires Maru"



The "Buenos Aires Maru," 10,000 Tons, O.S.K.'s South American Liner, Built at the Nagasaki Dockyard of the Mitsubishi Shipbuilding Co., Ltd., Leaving Kobe on November 16, on Her Maiden Voyage for Buenos Aires

The Osaka Shosen Kaisha has recently placed on its South American service two new 10,000 ton diesel-engined steamers, the *Buenos Aires Maru* and the *Rio de Janeiro Maru*, the former sailing from Kobe on her maiden trip to Buenos Aires, November 16, 1929.

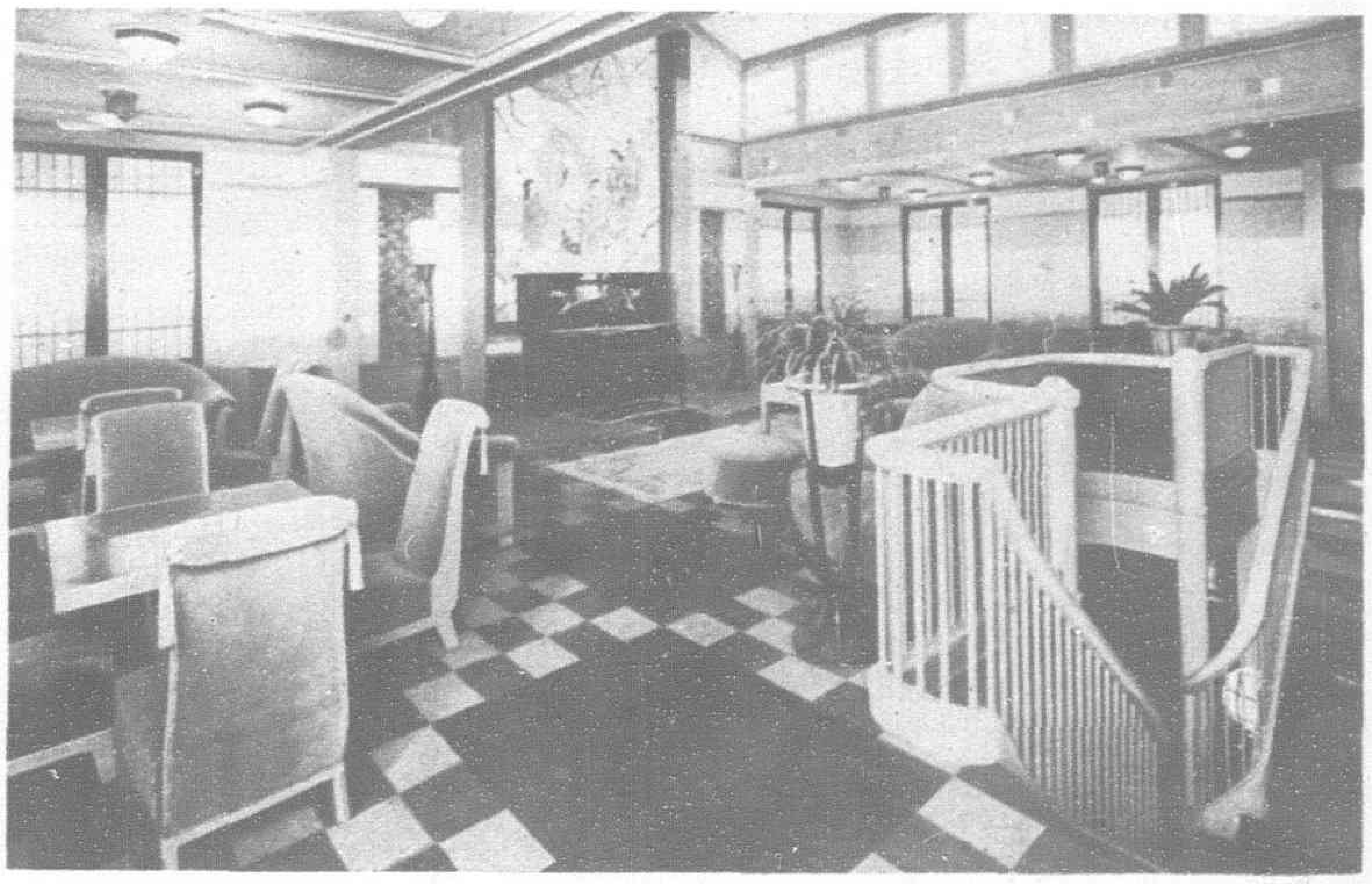
This company opened its South American line in 1916, operating between Japan and Argentina *via* Africa. In 1920, the company extended the line with the assistance of a government as far as Buenos Aires: in the outgoing voyage. The service, starting at Yokohama takes in Kobe, Nagasaki, Hongkong, Saigon, Singapore, Colombo, Durban, Cape Town, Rio de Janeiro, Santos, Montevideo and Buenos Aires. On the homeward voyage, the steamer calls at Santos, Rio de Janeiro, New Orleans, Galveston, Panama, Los Angeles, and Yokohama.

The company placed the *Hawaii Maru* and the *Manila Maru*, two 10,000 ton steamers on this run in 1924. In 1925, it built the diesel-engined steamer *Santos Maru* for this line, and then the *La Plata Maru* and the *Montevideo Maru*. In order to further improve this service, the company has now built two diesel engined passenger boats to be operated on this line, and these are the *Buenos Aires Maru* and the *Rio de Janeiro Maru*.

Main items of the *Buenos Aires Maru* are as follows:

Tonnage, 10,000 tons; Displacement, 15,000 tons; Cargo capacity, 11,000 tons; Length over all, 482 feet; Breadth, 62 feet; Depth, 39.6 feet; Main engines, Mitsubishi Sultzer diesel engines.; Actual horse power, 6,722 h.p.; Speed, 17 miles; Passenger capacity, First class, 60. Third class, 1,076.; Builder, The Nagasaki Dockyard of the Mitsubishi Ship-building Company.

"Buenos Aires Maru," First Class Dining Room



First Class, Foyer, The "Buenos Aires Maru"

Two More Oriental Vessels Launched

Recently the launching of several large vessels destined to play an important part in Oriental commerce, have been announced. The two most recent are the *Olympia* and the *Blinjoe*.

The *Olympia* is a cargo motor vessel, and has been built to the order of the Orient Steamship Company of Copenhagen, and was successfully launched on October 22 at Nakskov Skibsvaerft, Nakskov, Denmark. The ship is built to Lloyd's highest class, with open shelter deck, forecastle, houses amidship and aft, and with double bottom. She is fitted with five hatches, two masts and two samsonposts. Eleven derricks, of which eight can lift three tons, two, five tons, and one 15 tons: ten electrical winches are fitted, of which eight can lift three tons and two, five tons, also an electrical windlass. The propelling machinery consists of two Burmeister & Wain Diesel motors of 3,800 i.h.p. total, giving the ship a speed of 12½ knots when fully loaded. On the berth now vacant the keel is to be laid for a motor vessel to the order of the East Asiatic Company, Limited, of Copenhagen.

On October 26 the Intermaas Shipbuilding Company, Slikkerveer, launched the first of the six sister ships under construction of or ordered from these builders, and especially designed for the Koninklijke Pakatvaart-Maatschappij oriental services.

This vessel, which is named *Blinjoe*, is of 252 feet in length between perpendiculars, 40 feet moulded breadth, and 15 feet 6 inches moulded depth to upper deck, on a mean draft of 11 feet 6 inches, and her deadweight capacity will be 1,175 tons. The vessels are being constructed to designs under the supervision of Mr. M. A. Cornelissen, consultant naval architect, Amsterdam, to Bureau Veritas classification. Accommodation for a limited number of passengers will be provided on the shelter deck. The machinery and boilers are being constructed by Gebrs, Stork & Company, Hengelo, to designs and under the supervision of the K.M.P. superintendent engineer. A four-cylinder double-compound, Lentz-poppet valve engine, with cylinders of 370 and 800 mm. diameter by 800 mm. stroke, developing 1,000 i.h.p., will give the ship a mean speed of 10 knots. Steam will be supplied by one Babcock and Wilcox water tube boiler with underfeed mechanical stoker. Steam for deck auxiliaries will be supplied by a Cochrane boiler.

The Fusenko Hydro-Electric Power Plant

From the Complete Report by K. Morita, Director, and Y. Kubota, Chief Engineer, of the Chosen Hydro-Electric Company

The Politics of Nitrogen Fixation in Japan

Japan, as an agricultural country, finds it necessary to employ increasing quantities of fertilizers. Natural fertilizers—particularly bean-cake—are still much in use, but artificial nitrogenous fertilizers are coming more and more into use. Ammonium sulphate is peculiarly adapted for application in Japan and farmers are favoring its use in place of bean-cake. This fact has caused the establishment and expansion of the nitrogen fixation industry in Japan.

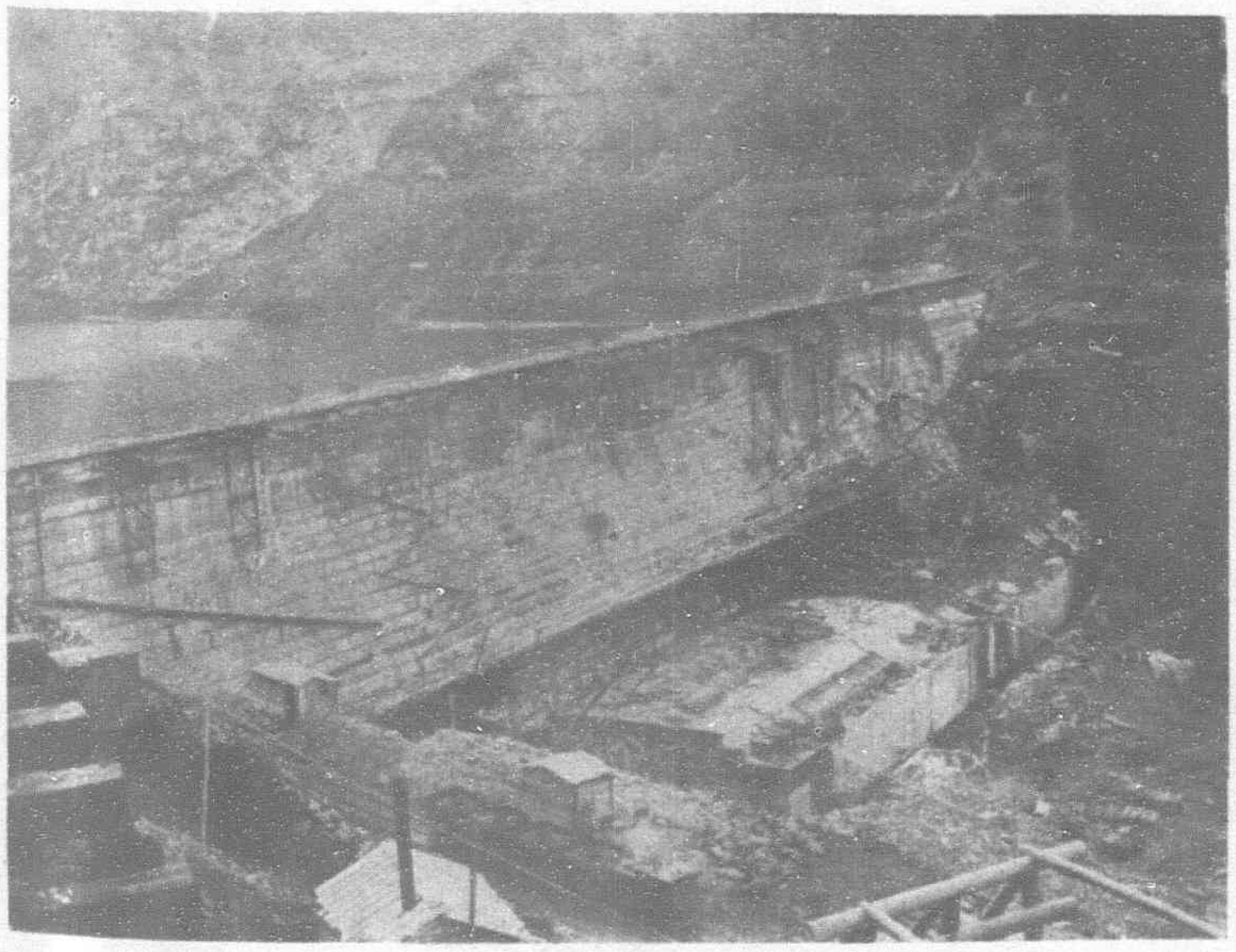
Considering the capacity of plants already in operation and the new plants under construction, it appears that Japan is slowly approaching the time when domestic production of ammonium sulphate will be sufficient to meet the demand. During 1928 the total production was 270,800 tons, possible production for 1929 approaches 400,000 tons and it seems certain that by 1930-31 production will be greater than 400,000 tons, with a possibility of 450,000 tons. The yearly demand is slightly in excess of 600,000 tons at present, and with the lower prices that are promised the demand should also increase. In fact, it is reported that this increase in demand for ammonium sulphate in preference to bean-cake is already under way. During the first four months of 1929 the importation of bean-cake into Japan declined 79,870 tons from the figure for the same period of 1928, and the imports of ammonium sulphate show a gain of 41,596 tons over the 1928 figures. It does not appear that Japan can produce sufficient ammonium sulphate to meet the demand for at least five years to come, particularly because some of the plants which are to have the greatest capacity will not be producing to capacity for two to three years.

Particular significance must be attached to the Fusenko Plant because of its huge dimensions and output. For years, Japan has been dependent upon Manchuria for its fertilizer in the form of bean-cake. If fact, beans—soya beans, may have been regarded as the basis of Japan's economic policy in Manchuria, just as these same beans served as the principal commercial asset of the South Manchuria Railway and the port of Dairen. To-day, Japan is preparing to become free from this economic dependence upon Manchuria and the soya bean. How far-reaching politically such a change in relations will be, only time can tell.

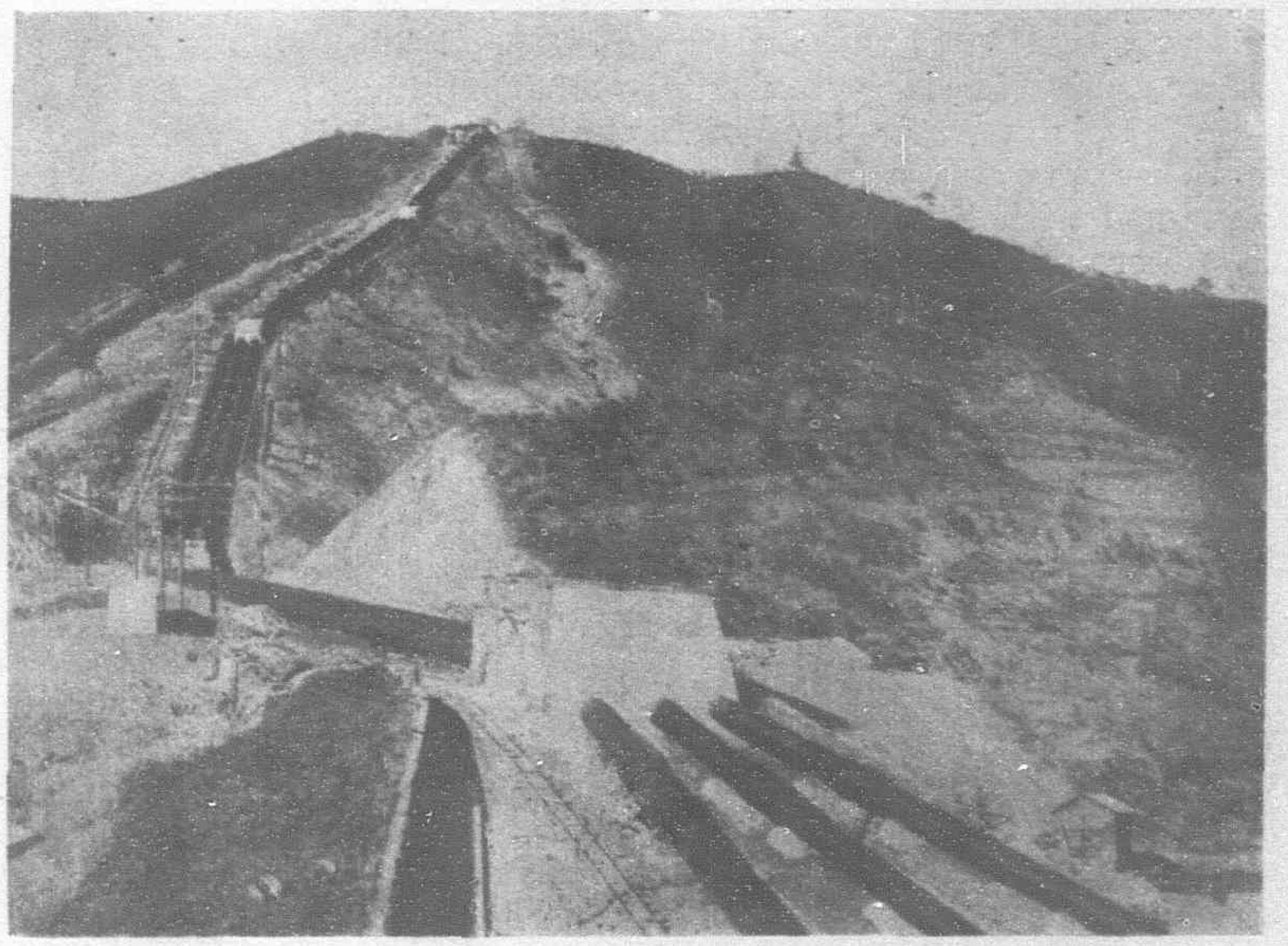
At the total estimated cost of Yen 50,000,000, the Chosen Hydro-Electric Company, Ltd., Korea, is building its three power plants and transmission lines under direct supervision of Mr. Y. Kubota, Engineer-in-Chief of the company. The first section of the Shoko No. 1 Power Station, one of the projects, has recently been completed.

In the northeastern part of the Chosen Peninsula there is a plateau centering around 40 degrees 30 minutes North Latitude and 127 degrees 35 minutes North Longitude. It is, on the average, from 1,150 meters to 1,300 meters above sea-level and its slope is approximately 1/200 towards the North. Through this tableland flows the River Fusenko about 100 kilometers in length, which later empties into the Choshinko River. About 50 kilometers below this, it then unites with the Great O-riyoko River which lies between Chosen and China with its outlet into the China Sea. The turning point of this plateau is called the Fusen-Rei, and on the opposite side of this plateau the slope is so steep that it drops 1,000 meters in a space of approximately 4 kilometers. The water which collects on this elevation goes down the valley to form a part of the Josenko River and then flows into the Japan Sea.

The Funsenko after flowing through the plateau for about 40 kilometers forms a narrow and deep ravine. By building a big gate at this point, the whole stream may be checked and the table-land, through which the river flows, may be made into a great reservoir. This can then be regulated in such a way as to give a steady water flow. In the deepest part of the plateau, which is the bottom of the Josenko, a water route (canal) is cut in the direction against its natural descent towards the source, thus leading the water to the opposite side of the plateau, allowing



The Fusenko Dam



Pipe Line Construction

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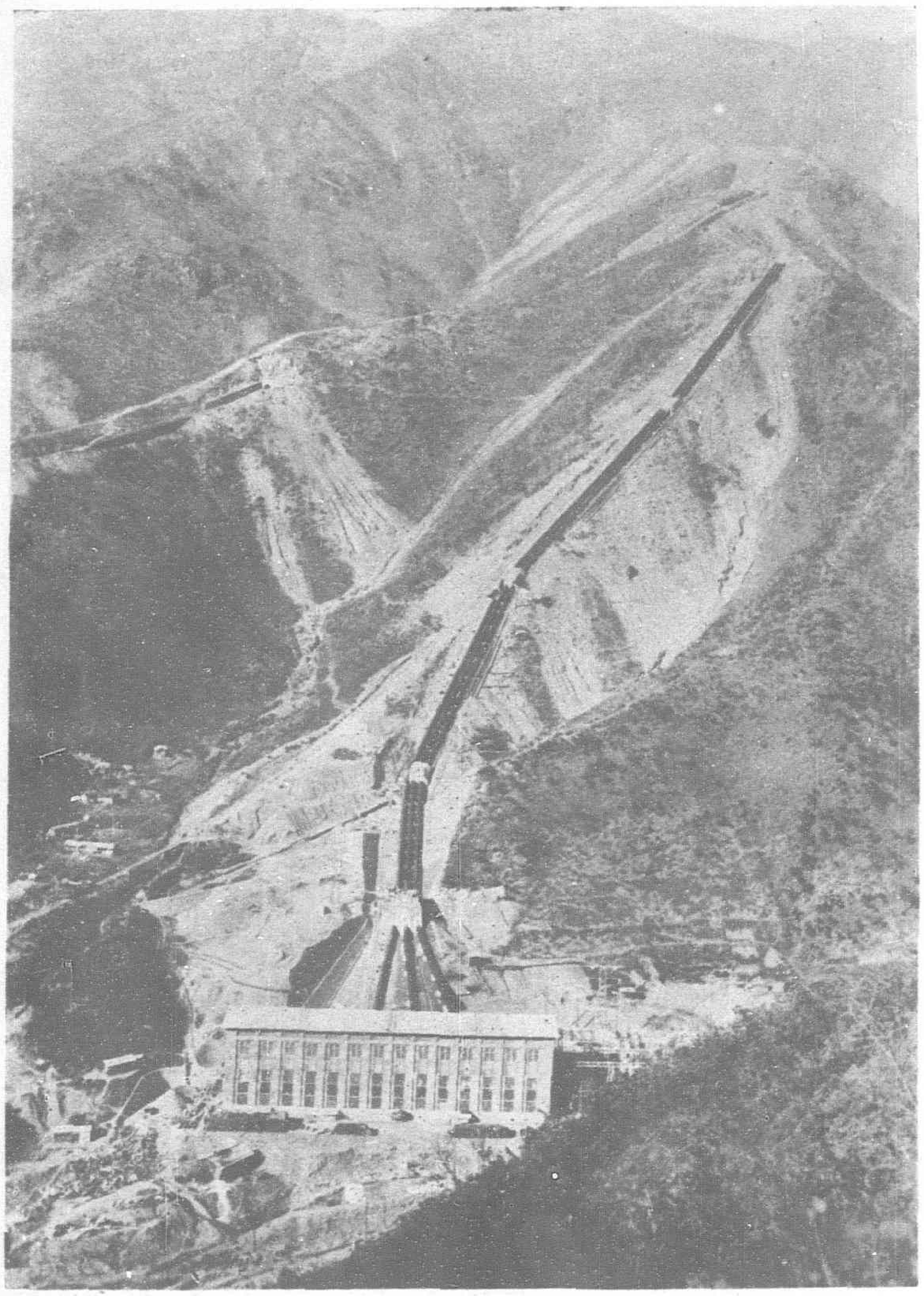


Pipe Line Leading to Shoko No. 1 Power Station

it to drop into the Josenko River. The fundamental plan of this construction is to utilize this high head and generate 190,000 kW. of hydro-electric power. A description of the plan is as follows:

Power Station	*Location*	*Length of Waterway*	*Effective Heads*	*Output of Generators*
Fusenko No. 1.	Shokori	26.6 km.	691 m.	130,000 kW.
,, ,, 2.	,,	38.5 ,,	215 ,,	42,000 ,,
,, ,, 3.	Tokori	5.8 ,,	93.2 ,,	18,000 ,,
Total		6.1 ,,	999.2 ,,	190,000 ,,

The area of Fusenko waterway, which may be called the reservoir, is 794 square meters and the average amount of water used for this purpose is about 23 cubic meters per second. The daily fluctuation of the load is almost negligible, but the annual power production is approximately 160,000 million kilowatt-hours.

The high effective head of Power Plant No. 1 is very unusual, and there are only a few places in the entire world which can be compared with this generating station in this respect. It is said that there are two similar cases found in the Rocky Mountains in North America. The area of the reservoir is 24 square kilometers, and the highest water level is 1,224 meters above sea level; the total amount of water reserved is 670 million cubic meters, of which 465 million cubic meters are available for use; the greatest depth is 73 meters; and the effective depth is 27.1 meters.

The dam is of the gravity straight concrete style. Its height from the bottom is 80 meters, and its length at the top is 400 meters, while the amount of concrete used in construction approximately totals 500,000 cubic meters.

The rainfall at any time of the year is stored in this reservoir which can easily hold the supply of many years. The flow of water even at times of flood can be safely preserved here for use later on, and only in case of the greatest floods, which come only once or so in so many years, is it allowed to escape by being made to flow over the walls of the reservoir. The water main leading to the power plant from the reservoir is constructed of concrete-lined pressure tunnel, while the pressure of water is 35 to 60 square meters depending upon the route.

The water main of Number 2 and Number 3 Power Plants are of the ordinary tunnel construction.

At the end of Number 1 water route is a surge tank built up from the rock from which it is led by steel pipes to the generating station.

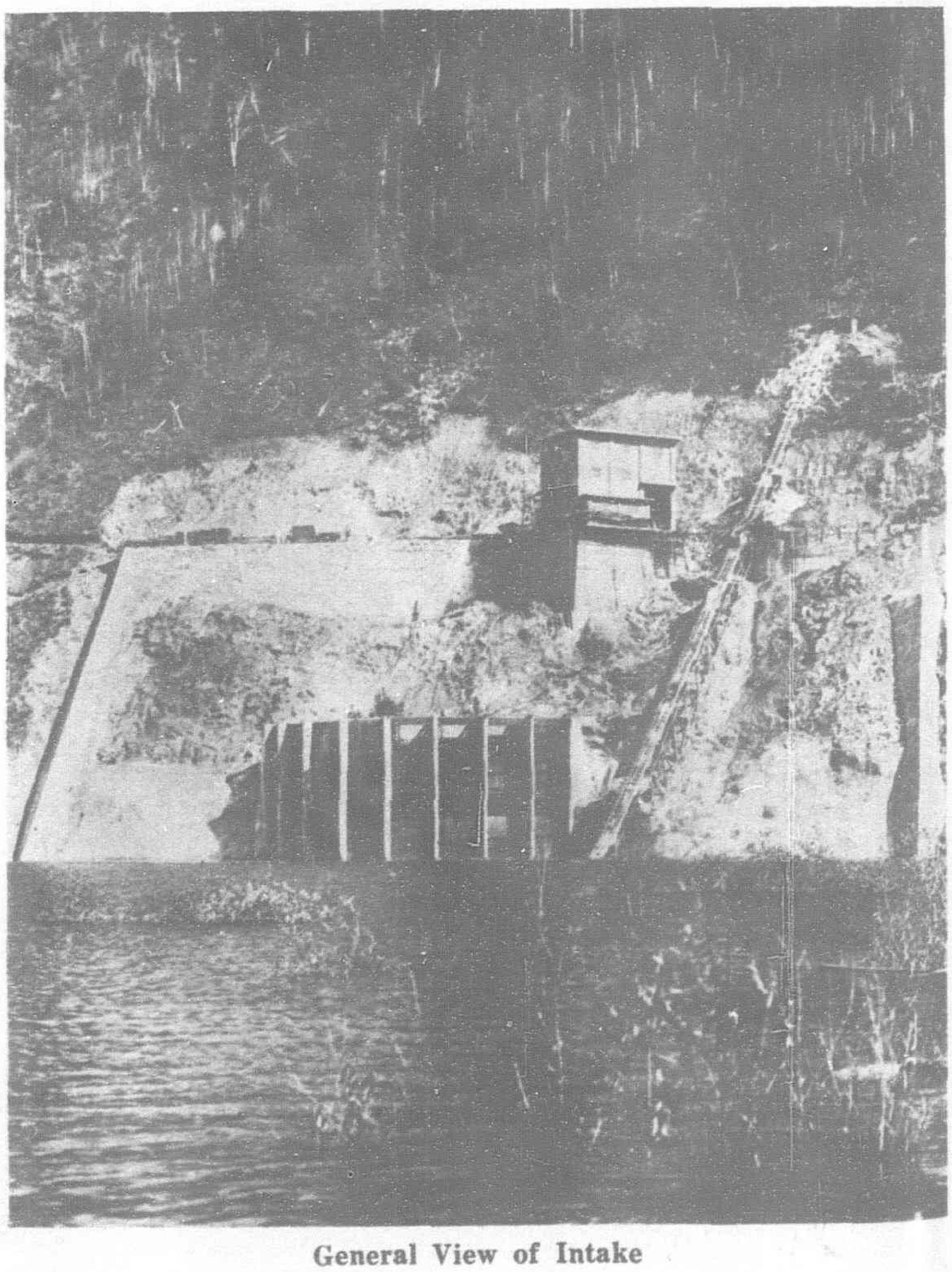
The chief points of interest in the power station are as follows:

Power Station	*Length of Pipe line*	*Units of Pipe line, Water Wheels, Generators*	Water *wheel Unit H.P.*	*Generator Unit kVA.*
Fusenko No. 1.	283.3 m.	4	45,000	36,000
,, ,, 2.	476 ,,	2	31,000	23,000
,, ,, 3.	240 ,,	1	37,000	20,000

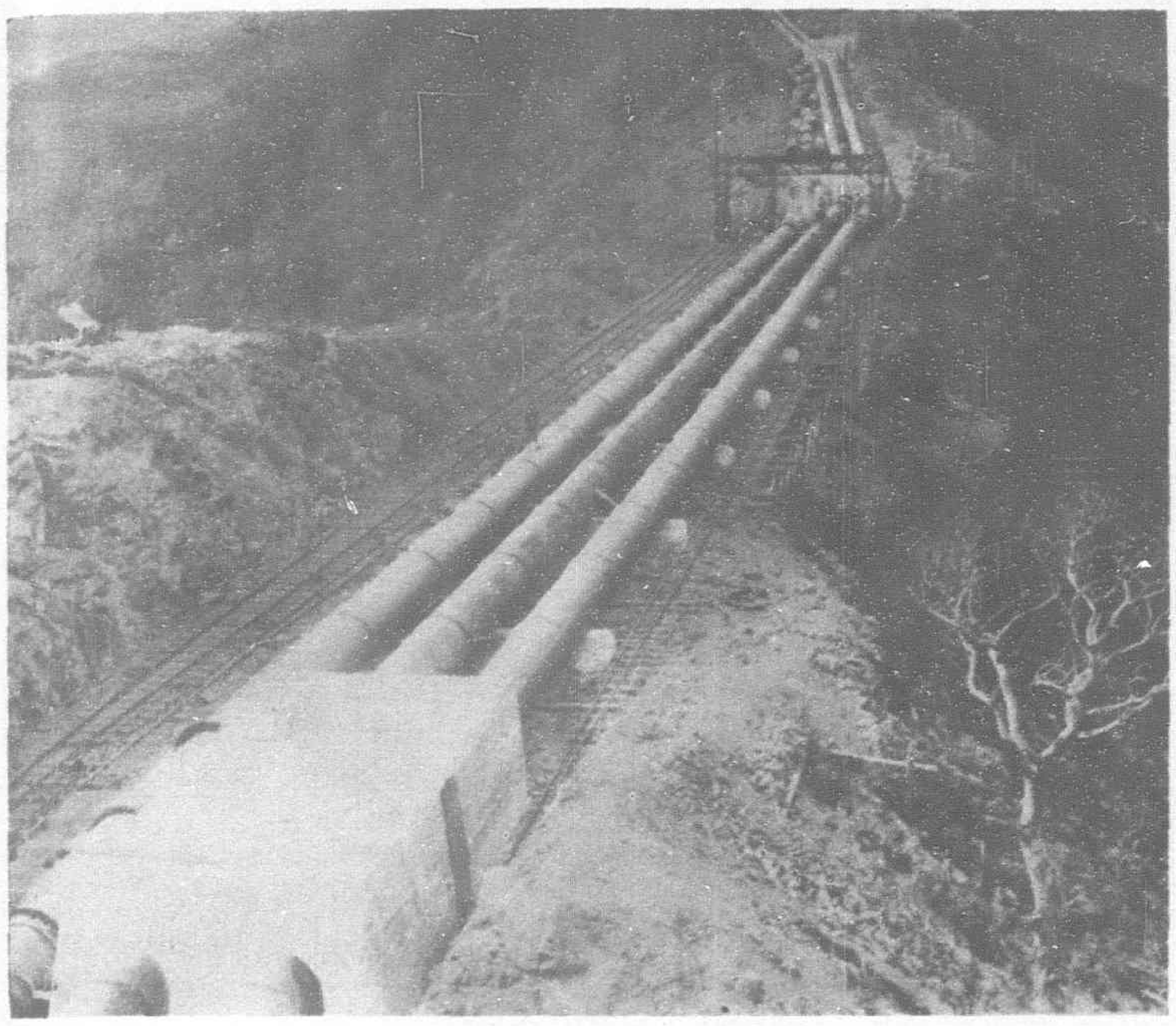
The water wheel of Power Station No. 1 is of the horizontal double jets single runner Pelton type, and those of No. 2 and No. 3 are of the vertical shaft spiral casing single discharge reaction turbines. Every generator generates an electric power of 60 cycles 11 kV., which is then transformed by the outdoor transformer to 110 kV. The No. 1 generating station has two routes divided into four lines which are connected up with the No. 2 and No. 3 generating station, one line of which then transmits the electricity to the factories in need of such power. The distance between the generating station and the transmission plant is 61.1 kilometers.

Under this plan and in accordance with the special contract made with the Chosen Nitrogen Fertilizer Company, the greater part of the power generated here will be supplied to the new factory to be constructed at Kankyo-Nando, Kando-gun, Ko-nan. In this factory electric power will be used to change water into its elements, hydrogen and oxygen, and the former is, in turn, combined with the nitrogen from the air in a certain way to form ammonia. This is then transformed into sulphuric ammonia and other nitrogen fertilizers or other products of ammonia.

The remainder of the electric power generated in this way is used by the other general consumers. But as the power is very cheap and abundant, it will be a great aid in developing, in the



General View of Intake



The Upper Pipe Line

distant future, an industrial city, with the aid of such powerful factors as harbor, railway, wide plain and other considerations.

Thus, the completion of this enterprise will be the beginning of the industrial revolution of Chosen, which, up till the present time, has had no real beginning.

In the summer of 1925 the right for the enterprise was obtained, after which surveying was immediately begun and completed in October. The first part of this construction was completed in September 1929.

With the partial completion of the reservoir, the complete construction of Power Plant No. 1, and the partial completion of the generating machine of Power Plant No. 1, about 60,000 kilowatt-hours of electric power have been generated. Since August of this year the construction work of the Power Plant No. 2 and No. 3 have been started and it is expected that these will be completed by the end of next year together with the remaining part of the No. 1 Power Plant and other constructions connected with this enterprise.

Design and Method of Construction

(1) DAM CONSTRUCTION.—The dam used in the preparatory emergency work was the straight line, gravity type overflow, concrete dam. The construction work was divided into two periods. The first was to build a dam to the height of 52 meters from the rock at the bottom of the river and 1,200 meters above sea-level. The volume of this construction was about 200,000 cubic meters. Then in the second period the height of the dam was to be increased to 80 meters from the river bottom and 1,225 meters above sea-level, as the overflow is 1,221.5 meters above sea-level. 300,000 cubic meters of concrete is to be used, in addition, to complete this work. The first dam on the lower side of the river is built in steps so as to assist in the union when the second work is completed. Furthermore, an inch bar was left extending out from the lower dam body so as to connect the upper.

The following figures were used as a basis for the construction of the dam: Weight of concrete, 145 pounds per cubic feet; uplift of water pressure for all horizontal sections of the concrete dam, 30 per cent. at the upstream and no pressure at the down stream; ice pressure at the top, 20,000 pounds per foot; mud pressure 1.7 times that of water pressure at the depth of 100 feet from the deepest bottom; coefficient of sliding friction equals .75; no seismic force; and no tension on concrete.

In the actual construction of the first part of the program for the dam, allowance was made on the above figures, especially at the top of the dam, which is being built a little wider than was planned at first. The actual weight of the concrete now in use is 143 to 145 pounds per cubic feet, but since the dam is the foundation on which the company's plans are evolved, special plans are now being investigated to make the second part of the dam construction even safer than the first.

The uplift of water pressure which comes through the rock bottom is taken care of by grouting, while that which comes through the concrete bottom is topped by taking special pains in constructing the bed of the reservoir. Besides, in Chosen there are hardly any earthquakes as in Japan, and even if there were such shocks, the seismic acceleration as considered in the above estimates, is practically negative, so it does not have any great effect on the construction.

In order to avoid any great ice pressure, compressed air bubbles are forced into the reservoir to keep the water in circulation and to prevent the formation of ice, thus adding to the safety of the construction.

Special plans to prevent any damage which may be caused by large floods occurring in a decade or so, were not included in the above construction, because the length of the flood period is usually short, and because most of the water could flow over the walls of the reservoir. If any damage was done to the bottom of the dam, owing to the too severe downfall of the water, this could be repaired by the time the next flood occurred.

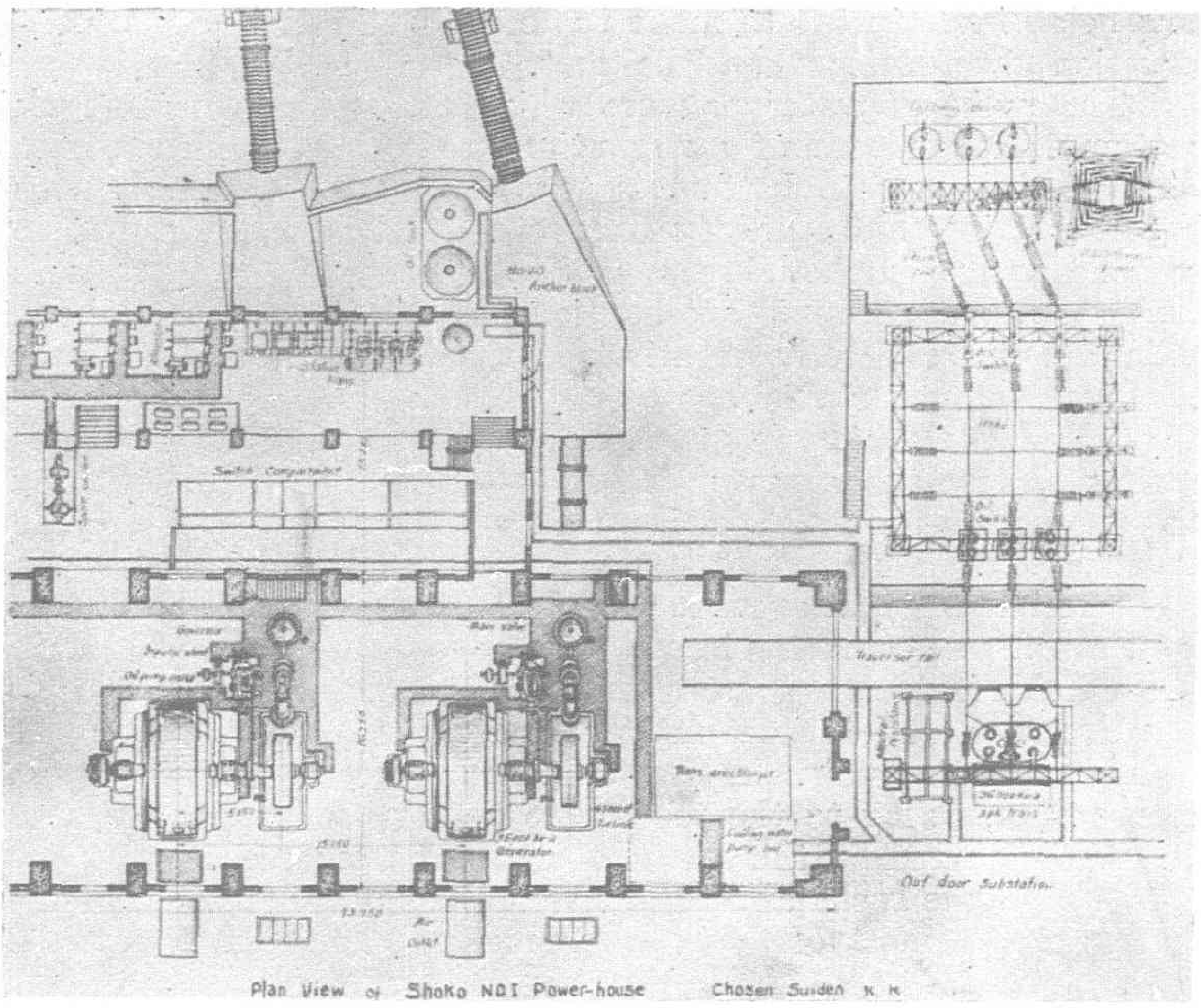
Some large rocks appear on the surface of the bottom of the reservoir, but most of them are from six to 10 meters below the reservoir bed.

Since the amount of water flow outside of the flood period was rather small, and since the width of the river was fairly large, it was easy to cut off the flow, in order to push the construction of the reservoir at the beginning. This was done by first building a dam on the right bank of the river in which were constructed three canals each 3.6 meters wide and 4.2 meters high. The water was run through these three routes, and the left side of the river was then deepened by human digging. Whatever water oozed out of the river was pumped away by means of a powerful electric pump, while the sand taken from the river bed was transferred by use of crab type winches. The water which came oozing out from the rock bottom of the reservoir was taken off by grouting in order to give strength to the dam. This was done by means of drilling to the depth of some 15 meters below the average depth of the trench in the upper regions of the construction. In some cases the drilling had to be carried on to the depth of some 30 meters.

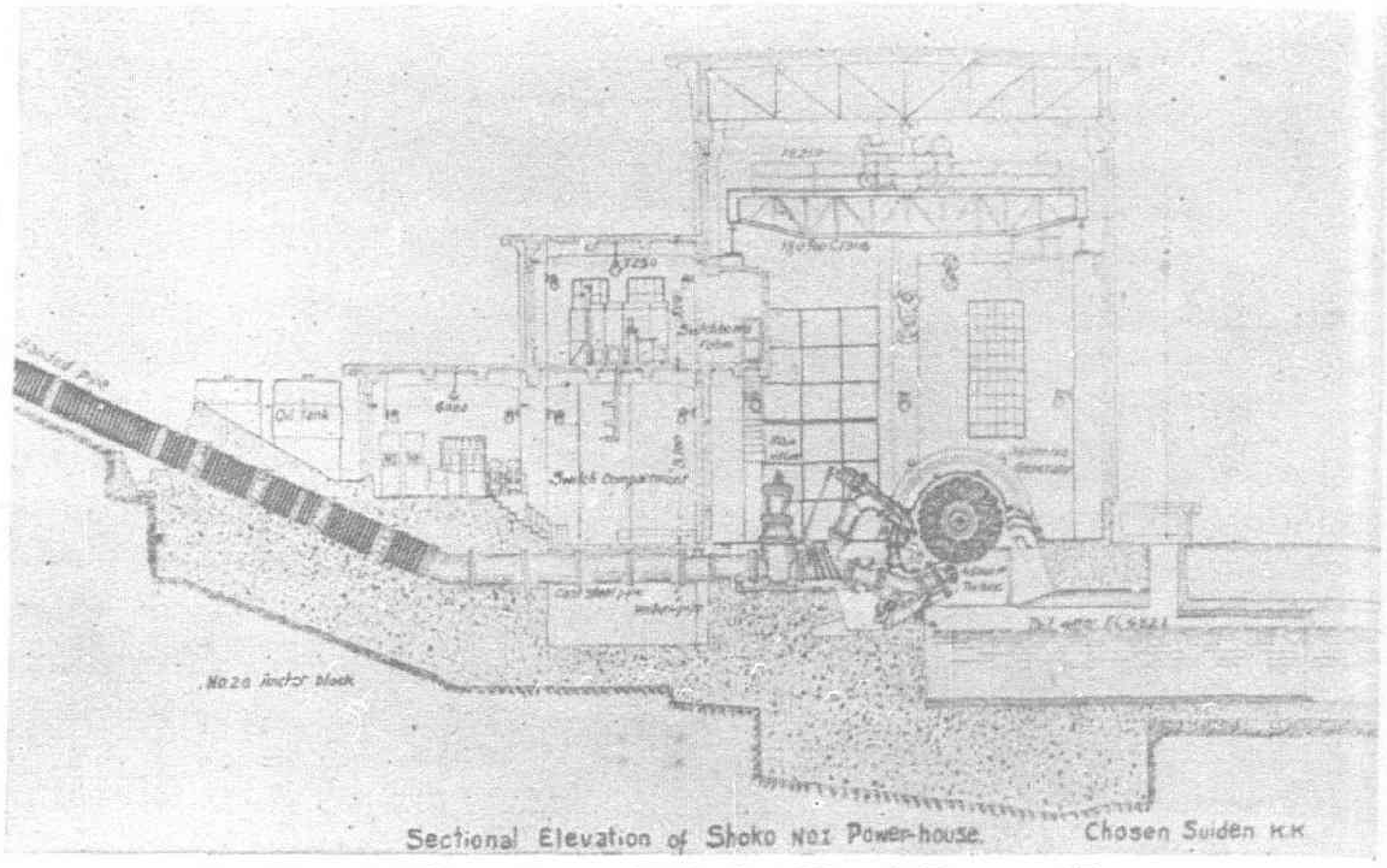
Two machines of the shot ball type produced by Ingersoll and Company, named the Calyx Core Drill, were used in the operations. At first, plans were made to make the drilling at a distance of six meters but due to a larger number of cracks in the rocks than was expected, more drills had to be made shortening the distance to three meters. In order to do this, the two Calyx drills were not sufficient, so two more machines, larger in size were employed. These were the compressed air driven drifters of the Ingersoll and Company, No. 71 type. Great difficulty, however, was experienced in drilling 15 meters, although a very large hole was made at the top.

The work of making the upset for the steel rod bit of the drifter was the thing which seemed difficult at the beginning, but

General Pipe Line Construction



1 Plan View of Shoko No. 1 Power House

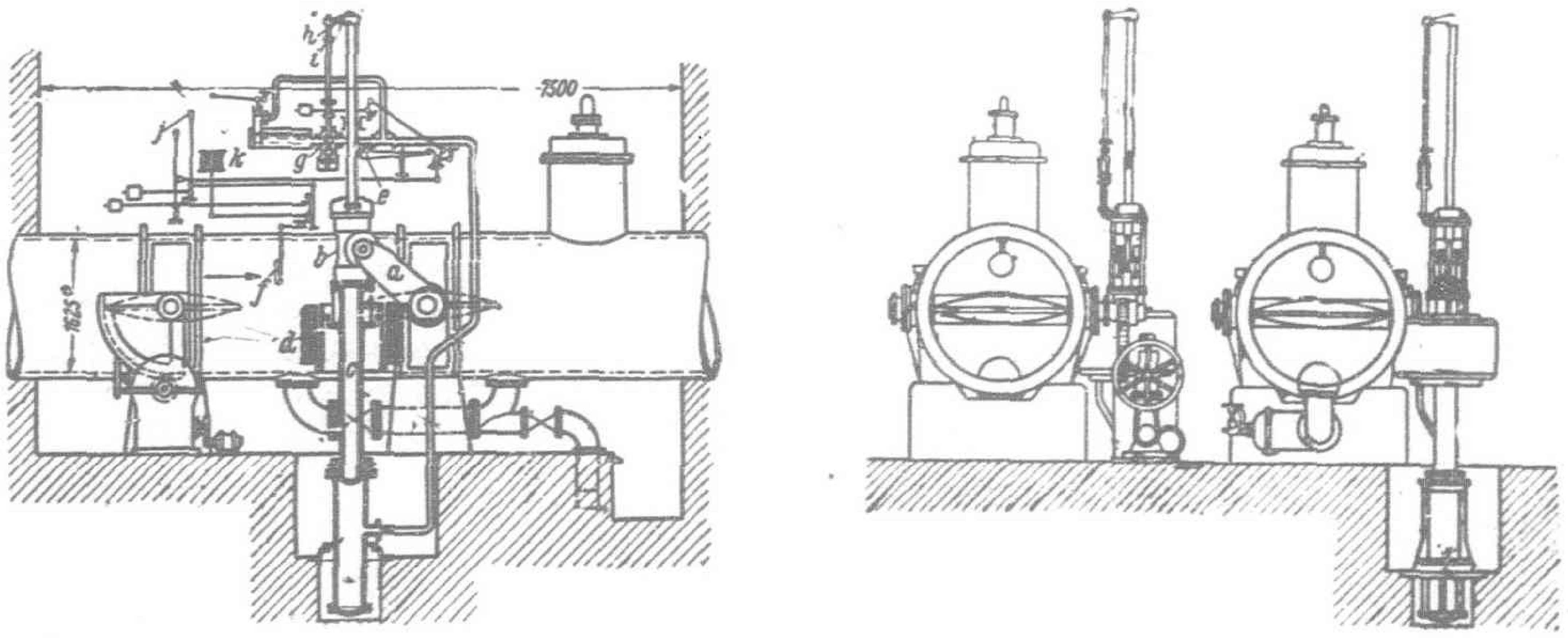


Sectional Elevation of Shoko No. 1 Power House

2

towards the end with more practice it could be made quite easily. After putting in the concrete to a height of about 18 meters, more concrete was blown in. This was done through the 2½ inch hole by means of a gas pipe attached to the drill hole, and which was lengthened as the occasion demanded. The hole was cleaned from the inside just before the filling operation by means of compressed air liberated from the bottom by gas pipe.

Water was first introduced into the chamber, then a mixture of five parts water and one part cement, after which a concrete mixture containing more cement was put in until the percentage of water and cement was nearly equal. The compressed air pressure was 90 pounds per square inch. However, since the grout tank was placed more than 15 meters higher, the concrete was put into the cracks of the rocks at a pressure of more than 115 pounds per square inch.



3

Quick-Shutting Mechanism for Penstock Valve

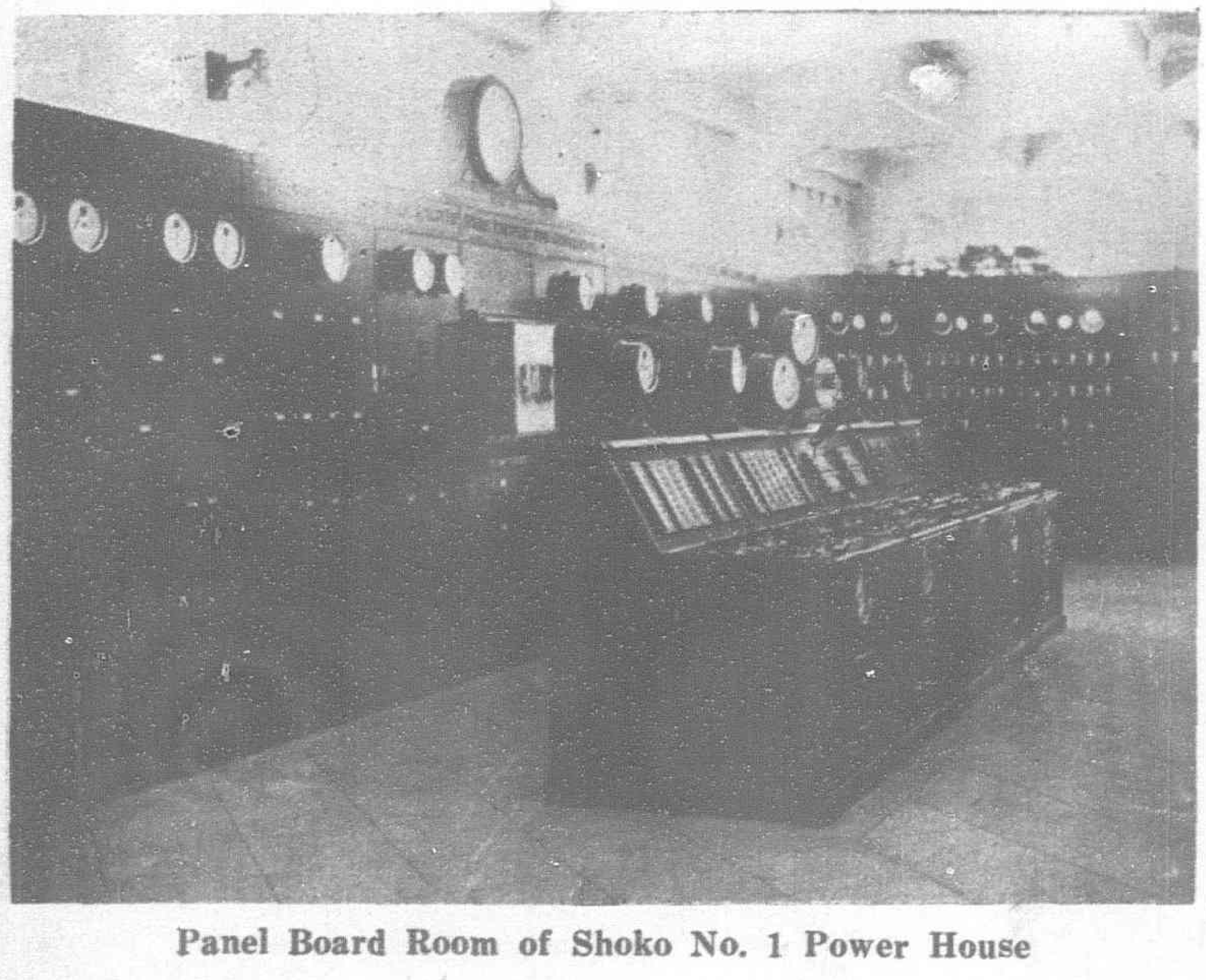
(a) Arm on Valve Spindle
(b) Guide Head
(c) Plunger of Servomotor
(d) Drop-weight
(e) Locking Lever
(f) Thrust Plate
(g) Control Valve
(h) Guide Arm
(i) Stop
(j) Hand Levers
(k) Solenoid

The amount of cement put in the extra large drilling hole sometimes totaled as much as 120 bags, each containing 50 kilograms of cement; but on the whole the average was about 15 bags with the majority requiring about 30 bags. There were some which required as little as two bags.

In some holes which required over 100 bags it is thought that instead of all the cement entering the cracks of the rocks some part might have been deposited outside, due probably to the fact that the drill hole was made in the center of the trench, and because of its being near the bottom of the upper part of the reservoir.

Since the amount of cement used in some holes was thought to be greater than was expected plans were made to drive another hole to be grouted in between the three meter holes during the coming winter when the work on the dam construction will be stopped. This will mean a drilling at a distance of 1.5 meters each.

Therefore, the height of the concrete will, in that case, be more than 60 meters taking everything into consideration, for



Panel Board Room of Shoko No. 1 Power House

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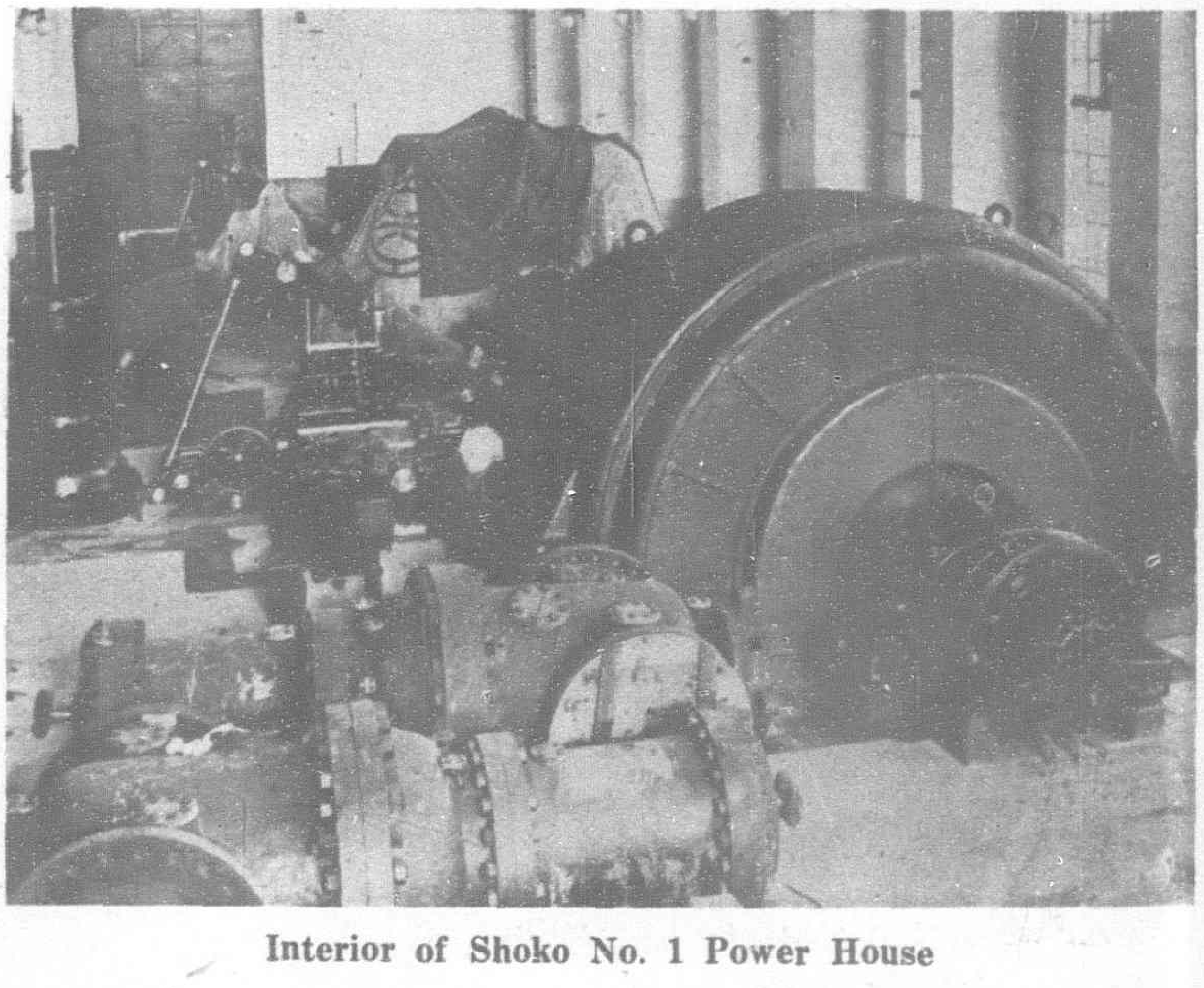

Interior of Shoko No. 1 Power House

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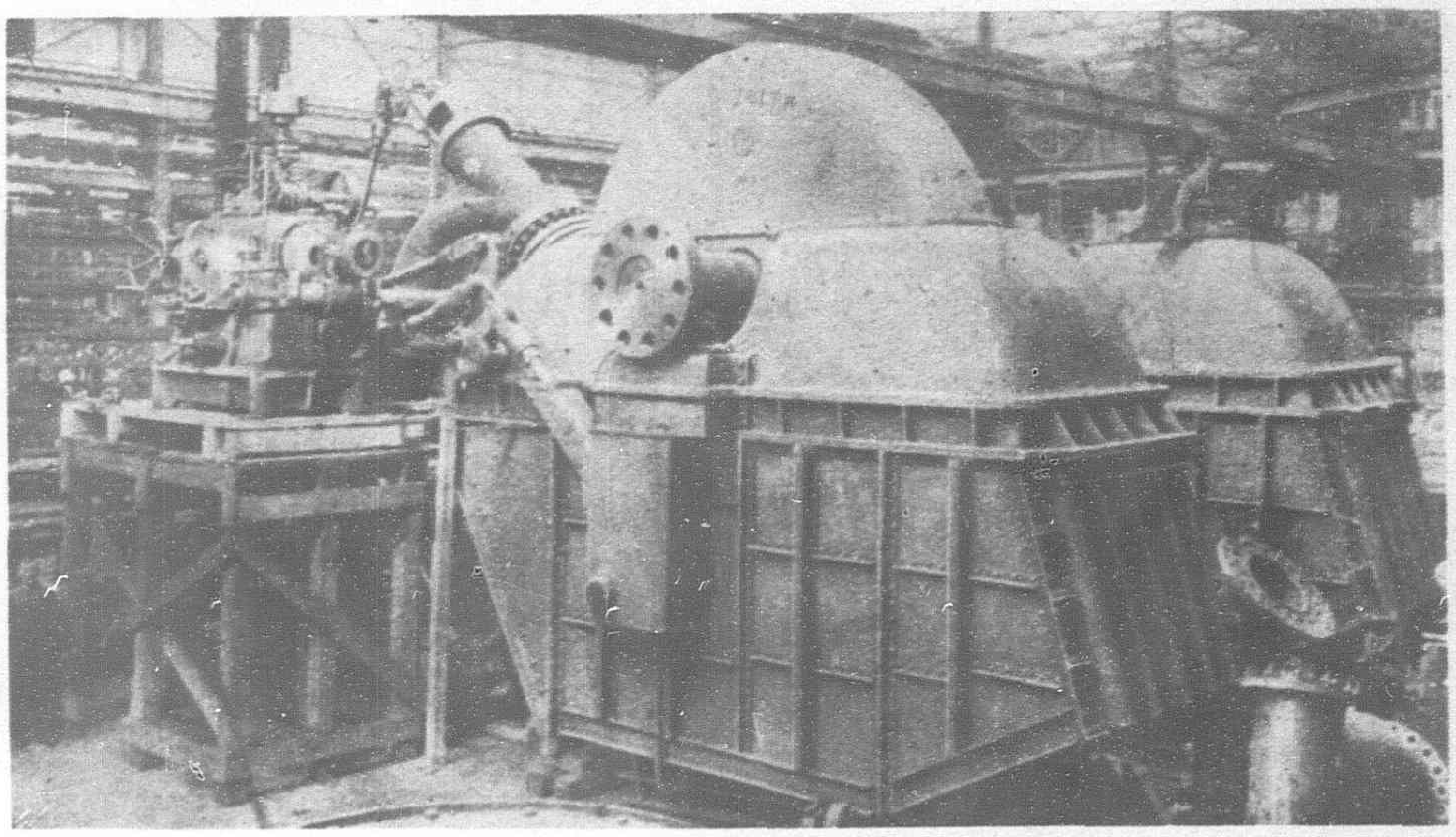


45,625-H.P. Impulse Turbine, View Looking at Driving End. The Governor is Seen on the Left

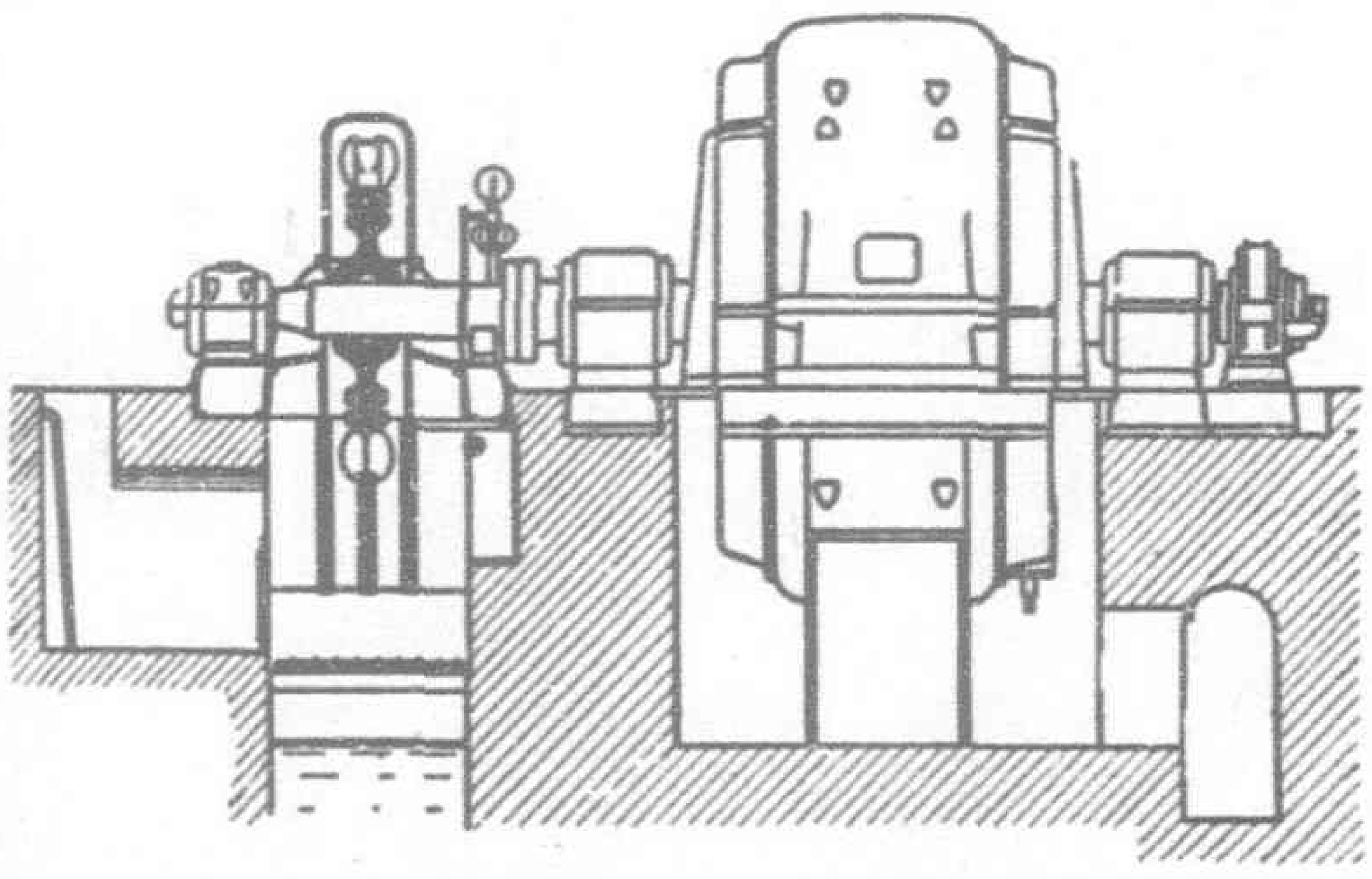
which another Calyx drill will be employed, making three in all.

The grout mixer was of the simple intermittant type and concrete was put in by means of air; so precaution was taken by the workmen to see that no air got into the concrete. This could be ascertained by experienced operators by watching the action of the hose; besides any one could easily tell just how the mixer was working by means of the test cock. For the grouting of the inside of the tunnel similar precaution was taken.

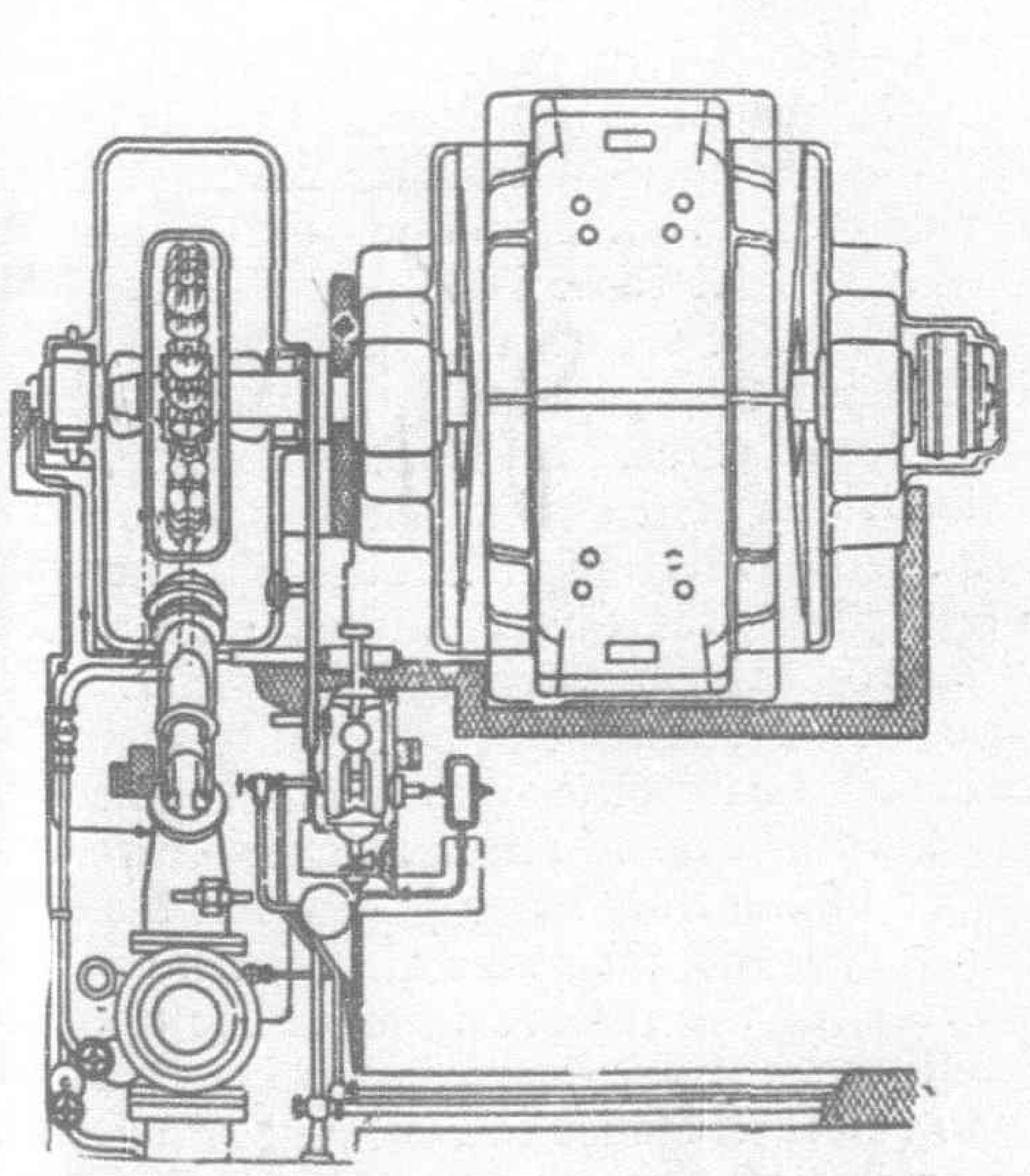
The cement is taken by means of an aerial cable railway to the shed near the construction work, about 1,235 meters above the sea-level. Sometimes the cement was taken direct to the place where it was needed and was put into the cement bin by means of iron pipes. The cement used here was mostly produced by the Onoda Cement Company in Chosen.

The dam is constructed in a series of blocks with vertical joints at a distance of 16.3 meters to 27 meters. Iron plates are placed inside the dam wall at the joints forming expansion joints in order to prevent the water from leaking out of the reservoir.

The construction of the dam is done by completing it first to a height of 1.5 meters and then adding on gradually. Since there were some stones of nearly 10 centimeters in the concrete, the dam was built with the base wider than the top.



Plan of Generating Set, Fusenko Power Station, Korea



Side Elevation of Fusenko Generating, Set

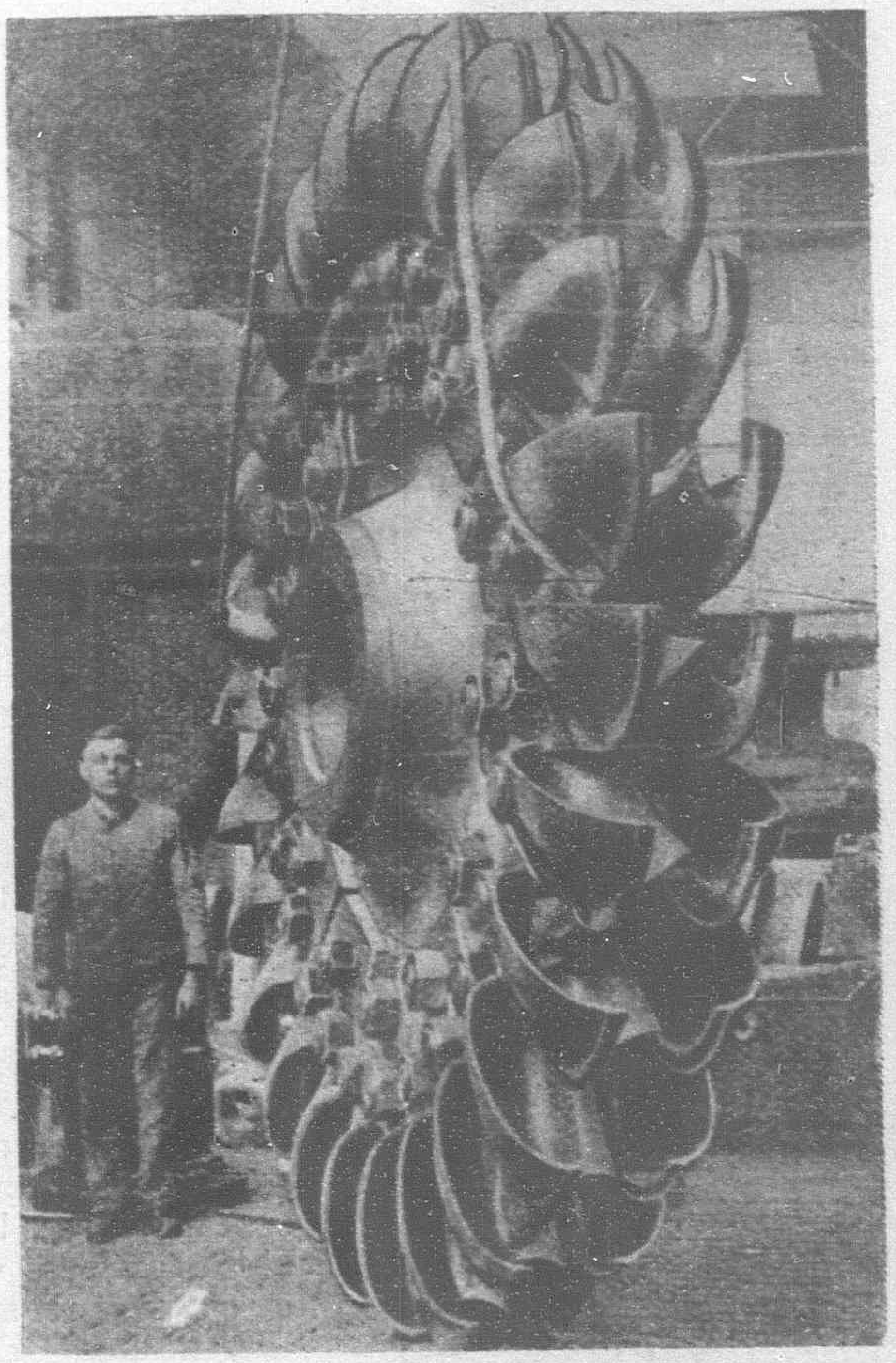
The concrete work was started in August, 1927, and the construction to be done in the first period was almost completed by August of the present year. The water discharge line was closed, and the saving of water in the reservoir, to the estimated level of the first period, is now being undertaken. The construction since the Spring of this year has been proceeding smoothly as planned, and it is expected that by the Fall of next year the second part of the construction will also be completed.

(2) THE INTAKE CONSTRUCTION.—The intake is situated about the middle of the reservoir and at a distance of about 10 meters above the dam. The inlet base is at a height of 4.5 meters above the bottom of the reservoir so as to prevent the intake from becoming clogged. The mouth is led out to a place at the foot of the mountain having an incline of 30 or 40 degrees. The intake is made up of two parts—the part which can be seen from the outside and the vertical shaft with water gates. The inlets are in three steps—the upper, the middle, and the lower. Each has eight openings 3.6 meters wide and 2.12 meters long; 3.6 meters wide and 1.9 meter high; and 3.6 meters wide and 1.82 meter high, respectively. At ordinary times, 23 cubic meters per second of water, which is the amount that is expected to be used in this power plant, are taken from the upper and middle steps. The force of the water entering the inlet is .2 meter per second. It is constructed in such a way that there is no fear of sand or mud entering the pipe lines.

Iron gates were constructed at the inlet. The difference of 4.5 meters in height between the intake bases and the reservoir bottom might, in many years to come, become smaller by the sinking of the intake. In such a case, it would result in sand and mud entering the pipe lines. At such times if the lower gates are firmly shut, the necessary water supply can still be obtained by the upper two, without constructing a new intake. In the first period, the lower openings were constructed to make sure of the water supply, but later, upon completion, it may be found unnecessary to use it.

The inlet is funnel shaped. Between the openings, there are guiding vanes to lead water at uniform speed into the water path. In front of the inlet there is a rough screen net to prevent large floating bodies and other things from entering the pipe.

On the top of the gate shaft, there was placed a gate house with a winding-up machine, and below, there were the main gates, the auxiliary gate, and the movable screens. The shaft was used so that the water inside the water gate would not freeze.



Runner Wheel of 45,625-H.P. Impulse Turbine

The main water gate is at the bottom of the flow and is 3.64 m. × 3.7 m. in size. At the time of flood, it is able to withstand the water pressure of 34 meters. Considering the importance of water-tightness, the self closing caterpillar gate, manufactured by Phillips and Davies Company, was adopted. This gate is made in such a way that its contact with gate recess is of wedge shape so that by its weight, it fits tight and becomes water-proof. When beginning to pull it up, a fairly strong force is necessary to overcome this sliding friction, but once it begins to move, as its contact is of wedge shape, that sliding friction disappears and the caterpillar begins to work so the movement becomes easy. Directly behind the water gate, a vacuum is liable to be created at the time of partial opening, so an air duct is made and leads into the gate house. In front of the gate, a partition wall is placed, and on this wall is a sluice gate of ordinary type used as an auxiliary gate in case of emergency. The gates are usually installed on the floor of the water gate room. Besides these water gates, there are two movable screens working in turn to stop the floating obstacles from entering the pipe line. The obstacles are wound up together with the screen to the gate room and taken away. Within the gate shaft, buoys are to be built to measure the water-level. To prevent the sand and mud of the mountain side from falling on the opening of the water gate, the earth was taken away to the highest water level of the place and a thin concrete layer was used to coat the surface. Thus embankments were made so as to stop gravel and earth from entering the inlet.

This intake construction was begun in the Summer of 1928 and completed in August, 1929.

(3) Water Tunnel Construction.—The length of the water tunnel from the intake to the surge tank is approximately 26.5 kilometers and this can be divided into three parts—horizontal shaft; inclining shaft, and vertical shaft.

The distribution of the vertical shaft positions were so determined that the depth of the shaft and the distance between the shafts at all times might be completed in the same interval. In the beginning, it was assumed possible to excavate 45 cubic meters a day for the vertical shaft; 1.4 meter for the tunnel from the vertical shaft; and 1.8 meter for the horizontal. The time required for this was estimated to be two full years.

The water tunnel was laid out in places where there was mostly Gneiss rocks, and in a few places only were Schist rocks found. The grade of the water line was 1/1,800 and the water tunnel was horseshoe shape with a width of 1,697 mm.; but at places where the earth was not good, a round shaped tunnel was adopted with a diameter of 1,800 mm. A 1:6 plain concrete lining of 21 cubic meters minimum thick was used in general between the intake and the vertical shaft No. 12. But in places where there is a fear of dislocations or cracks in the rock bed, the thickness was increased 30 cubic to meters.

The water tunnel in the lower region crossing the mountain side had to be long, due to the fact that the water level is of the same height as the rocks at the head of the water route. So the construction was made so as to make the height twice that of the water pressure. This means a great conservation of water.

In short, the determining of the strength of the water tunnel was a very difficult problem because the rocks were not regular in shape, and especially because the rocks were both elastic and plastic and might end in permanent deformation when the pressure was applied, which could not be figured out at all beforehand.

In this manner the tunnel was completed, and while the incomplete construction equipment is still on hand, the company plans to carry out tests by subjecting it to the highest water pressure to see how it can stand the examination. The construction of the reservoir is a little behind the original schedule, so this new plan will be enforced, with the hope that, in the near future, the company will have the occasion of publishing its findings from actual tests made.

The following will deal with the Mortar grouting on the water tunnel which is one of the most important things to be considered in the construction and which is going to be placed throughout the entire length of the tunnel.

The construction of the vertical shaft was one of the most difficult undertakings. For this, a section 3.6 meters square, and 1.2 meters high constructed of wooden trusses bolted together, was suspended and lowered with the progress of construction. This platform was divided into four parts as follows: two for the use of cages; one for the pump, electric line and compressed air pipe; and the other, for emergency purposes.

Progress on the construction was delayed at first due to the inexperience of the workers handling the sinking pump for pumping out the water oozing out of the dislocated rocks and from the large cracks. However, work was speeded up later on when the sinking pump was installed on a scaffold at the very bottom of the ground and the water pumped out from the top of it.

For drilling the vertical shaft a small column was first bored by means of a jack hammer and drifter, and afterwards it was enlarged to the desired size by using a small jack hammer. In the construction of the other tunnel also, similar difficulties had to be overcome. The total amount of dynamite used in the construction was 600 tons.

The grouting of the entire tunnel was done thoroughly by using 1:3 mortar under 5-6 air pressure. The grout mixers were planned and constructed at the company's factory and numbered forty in all. The amount of grout used cannot be exactly determined at the present time because the construction is still going on, but the average amount is from 0.4 to 0.5 cubic meters per meter of tunnel.

A large number of vertical shafts were drilled, but only four will be left open for future reference, while the rest will all be closed up.

The water tunnel was constructed by taking both the inside and outside pressures into consideration. The rain pipe was constructed according to the old established manner.

(4) Surge Tank.—By considering the fall of the water level in the surge tank when the load is on the water-wheel of the power plant and the rise of the water level when the load is off, the capacity of the tank was determined. The former was determined at the surge down of the lowest water level, and the latter at the surge up of the highest water level. The difference in the water levels is as much as 27 meters; so there are lower and upper chambers for each, and a shaft connecting these two chambers. These two chambers and a shaft comprise the tank. To prevent the water in the tank from freezing the tank is constructed deep in the ground below the rock bed. As the water pressure increases, if the diameter of the shaft is so great that it would be dangerous if it is not well lined and protected outside, and also if there was a serious dislocation near the tank, the diameter of the lower water chamber was made to nine meters to meet these contingencies. Besides this, there was placed a horizontal chamber of 36 meters at an offset, and on the top of it a vertical shaft of 4.5 meters in diameter. The upper chamber was constructed as a horizontal chamber of 5.3 meters in height, 3.7 meters in width and 120 meters in length. Considering merely the design of the surge tank, it would be advantageous to have the upper and lower chambers high in a vertical direction; but taking everything into consideration, it would be more advantageous to reduce the water pressure in the water line of the iron pipe, so this plan was adopted. There are no places for the precipitation of sand, mud and small stones. But as the reservoir is of great size, there is no such need; and, if, by accident, such things should come into the water passage, the force of the water at the bottom of the tanks is so low that these particles would deposit there. For this purpose the water passage is made to diverge near the tank to reduce its force.

(5) Iron Pipe Line.—The iron pipe line is the most important line an its total length is 2,833 meters. Of this length, 188.5 meters were constructed through a tunnel allowing an iron pipe having an inside diameter of 3.15 meters, and wound up by protection on the outside so that there is no space left between the tunnel and the rock bed. The tunnel was of funnel shape at the entrance and was divided into four pipes of 1,625 mm. diameter inside at the exit. In the lower side of the concrete lining, there is a pipe to allow the water leaking out of the iron pipe to go out so as to prevent the iron pipe from collapsing when the pipe is empty.

At the end of the four pipes, there is a valve chamber. For every pipe line, there are two butterfly valves of 1,625 mm. inside diameter. The main valve is on the lower side and can be regulated by a push button on the switch board of the power plant. Besides, this, it also accomplishes the function of an emergency valve, and at such a time as a collapse of the iron water pipe when the force of the water flow becomes very great, the valve automatically shuts the gate. The other valve is of the reserve type and is operated by man-power. Besides these valves, there is equipped an air valve to allow the water to run into the iron pipe to meet the situation if there is a fear of producing a vacuum within the iron pipe due to the change in load. As the weather is as cold as 40 degrees C.

in winter, an ordinary air pipe cannot be used, so the valves were used. For safety, two valves of two different reliable makes and designs were used on every iron pipe line. One of these is such that even if the valve seat becomes frozen, and a vacuum is created, there is a device whereby the atmosphere can easily break through to fill up the vacuum. Furthermore, in this valve chamber, an iron pipe exit is prepared with a valve to allow the water in the surge tank to get out. It is expected that electric heat will be used in winter to prevent the various parts of the valves from freezing.

The iron pipe line is 2,640 meters in length, and as is explained in the section on the power plant location, it was impossible from a topographical standpoint, to let the water fall in a steep gradient or to utilize the static head of 736.6 meters. After a long investigation and a careful study, this long iron pipe was decided upon. The amount of excavation work done was 120,000 cu.m. and two reenforced concrete piles were constructed.

The four iron-pipes vary from 1,114 mm. to 1,625 mm. in the inside diameter. The force of the water at the top is 2.81 meters and at the bottom 5.65 meters with an average of 4.36 meters. The interval between the centers of the iron pipes at all places other than the valve chamber and the power plant, is 2.42 meters. The anchor blocks used were 20 in number and the distance between them was almost equal; but sometimes the distance was as great as 84.505 meters.

As this water pressure pipe was of the high pressure type and the amount of water was fairly great, it was clear that the ordinary riveted or welded pipes could not satisfy the requirements. Therefore some other kind had to be adopted. Seamless pipes forged directly from ingots, newly introduced pipes formed by the application of a centrifugal force, in the same way as castings from ingots, welded pipes with thicknesses of over 50 mm., welded pipes having cores covered with seamless bands on the outside, and in fact all the latest models of pipes were considered. Among these, the seamless pipes were thought to be theoretically most satisfactory, but their high price proved a drawback. There was a doubt as to the possibility of using welded pipes of great thickness. Even in the case of the banded pipe there was a slight doubt as to whether the core and the band would work together. But it has been found out through the recent successful use of this pipe under a high head on the eastern coast of North America, by a report of the destruction test, and by the sample of the same, that this kind of pipe could be used for this work. The forged pipe manufactured by the centrifugal method is as low in price as a seamless pipe, but being, as yet, in the experimental stage, it was thought inadvisable to take chances. The bid to supply this banded pipe offered by S. A. Ferrum of Poland was accepted.

Since the total weight of the pipes was 12,000 tons and the cost was Y.4,000,000, equal to approximately 10 per cent. of the total cost of construction at Fusenko, it was carefully calculated and planned to be laid out in the most economical way.

The welded pipe is to have a minimum thickness of 12 mm. and a maximum of 32 mm. Joints are to be of the riveted bump type to the thickness of 25 mm. and butt strap type, under that. The welded pipe of a thickness under 32 mm. is a banded pipe and joints are all of the butt strap type.

Expansion joints are placed on both sides of every other anchor block. As a result of this, it was possible to reduce the direct stress of the pipe and to decrease the size of the anchor blocks. A venturimeter was attached to every iron pipe to measure the speed of the flow.

(6) POWER PLANT.—The power plant is built on a rock-bed. The amount of excavation work was 12,000 cu. m., and among its sub-structures are ducts, water wheels, generator foundation, pit, etc. The concrete used amounted to 12,000 cu m. The building to house the generators is 16.24 meters in width, 73.75 meters in length, and 19.39 meters in height, and the switch board room is attached to it. Reinforced concrete was used in both cases. At a short distance from the plant is built the out-door transformer.

There are four generators capable of generating 36,000 kVA. each, so the total output is 144,000 kVA. Of these four generators, two have already been put in and their operation tested. It is expected that the remaining two will be put into operation by next spring. Considered either from the generator output or the total plant output, it is believed that this plant is by far the greatest in the Orient, the like of which can be found only in a few places in the world. In the following paragraphs an explanation of the various machines will be made:—

1.—*The Waterwheel.*—The output is 45,000 H.P.; 360 revolutions per minute; a single runner, double jet, horizontal shaft impulse turbine manufactured by S. M. Voith has been used.

As the head is over 700 meters and the pipe line is almost 3,000 meters, it is essential to have the water pressure on the water wheels well regulated. In this water-wheel, a deflector is used to regulate the water pressure, and the maximum increase in the pressure is kept below 10 per cent. The needle and the deflector are operated by Voith's patent double regulating governors. Compared with the method where the needle and the deflector are operated by a spring and a dash pot, which in turn is operated by only a single servometer and a single regulating shaft, it is believed that this type is far more dependable. It was considered difficult to use the water pressure regulator of the nozzle and needle type, because in a power plant of this kind where the load is almost all used for running motors, it is highly desirable to have the revolution of the water wheel and also the water pressure well regulated. One governor is attached to every water wheel and the oil pumps are at all times driven by electrical machines. In order to cope with the emergency when there is no electrical supply or in case of accidents to the electrical machines, 14 H.P. impulse water wheels are attached to every oil pump. The water supply to these machines is taken from the main pipe line, but the pressure is reduced by water pressure decreasing pipes.

To protect the iron pipe, special care has been taken in the design of the main inlet valve of the water wheel. The valves of the water operated type, used in this plant, were manufactured by Voith as were the water wheels.

If the main valve should be opened before the by-pass is opened, it would be dangerous so the valve is designed so that, even if it is turned by mistake, the main valve cannot be opened until after the by-pass is opened, and the inside of the water wheel is filled up with water. Furthermore, the servometer for opening the gates is operated by water pressure from the small opening which works within the time the valve was opened, thus preventing accidents within the pipe. The maximum guaranteed efficiency of the water wheel is 89 per cent. The diameter of the nozzle opening is 186 millimeters and that of the main valve, 900 millimeters. The weight of the single water wheel including that of the main valve is approximately 100 tons.

2.—*Generators.*—The output is 36,000 kVA.; Efficiency 90 per cent; 11,000 volts; 3 phase, totally enclosed horizontal type generators of the Siemens' manufacture are used.

The insulating materials used in both stator and rotor coils are of the so-called "B" Class, according to the A.I.E.E. regulation. In the transportation of the stator coil, it was divided into four parts and the rotor coil was divided into three parts. These were assembled at the location of the plant. The greatest weight in transportation was the 26-ton generator shaft.

For the rotor a cast-spider is used with a steel ring. The projected part of this ring is used as a pole core and the dove-tail attachment is not used. After having the coil on the core, the laminated sheet iron corresponding to the pole shoe was firmly fixed to the core with bolts. The adjustment of the coil is very easy. The rotor was completely assembled at the factory and an over speed test at 665 r.p.m., corresponding to the run away speed of the water wheel, was made. Then it was taken apart and transported to the plant. As a result no keys are used on the shaft which was fitted up by the water pressure.

The water cooled ring lubrication is used on generators and water wheels. An oil pump to be used in the beginning is attached to every generator.

A water tank for holding the cooling water was constructed at a height of about 30 meters above the plant. The water is raised to this tank by an electrically driven pump which is automatically regulated at the switchboard. It is then distributed to different places. Special care had to be taken to prevent the water pipes from freezing up in the coldest season of the year when the thermometer registers—30 degrees Centigrade. All outdoor water pipes are buried a few feet deep in the ground. From previous experiences, it was found that at the depth of four feet, there is no fear of the pipes freezing.

The neutral points of the generators are connected to the ground with a grid resistor of 6.8 ohms. At ordinary times, the generators of this plant are not formed parallel, so there is a resistor for every machine.

The armature is attached directly to the generator pole with an output of 184 kW. 250 V., shunt wound type. In addition a reserve armature was prepared. To every armature there is an automatic voltage regulation attached to regulate the voltage generated by the generator. To every magnet field of the generator, Siemen's patent quick de-exciting device was attached to that when the load is suddenly taken away, it is possible to reduce the field magnet, without its falling to one-tenth of the regular time required, thereby protecting the generator.

The outside width of the stator on the generator is 5,800 mm. and the length of the slot, 1,900 mm. The greatest diameter of the shaft is 900 mm. and its greatest weight is approximately 255 tons. The total weight of a single generator is approximately 230 tons.

3.—Transformers.—The main transformers are of the capacity of 36,000 kVA., 11,000-110,000, three-phase, outdoor type manufactured by Shibaura. Including the one for reserve, five transformers were installed. The weight of a single unit, including the oil, is 98 tons.

All the electrical output of this plant is supplied to the Konan factory of the Chosen Nitrogen Fertilizer Company. The distance of transmission was only 38 miles so the cost of the transmission line was very small in comparison with the total expense of the plant construction. For every generator a separate transmission line of 100 kV. was constructed so as to enable not only the generators and transformers but also the transmission lines, the power plant, and transformers to work as a unit thereby reducing accidents to the minimum. In case of necessity all the lines can be used in parallel. The guaranteed efficiency of the transformers was 90 per cent, the power factor, 98.85 per cent.

The neutral points between the transformers were connected by a grid resistor of 212 ohms. As the distance of transmission lines is small and the communication lines are few in the district there was no fear of obstacles interfering with the low current lines.

4.—Switchboard.—Oil-filled cut-offs were attached to both 11 kV. and 110 kV. lines. Also to the 110 Tie line another cut-off of the same type was put in. All the cut-offs on 110 kV. side were set up near the Power Plant. Five switchboards were of the vertical type. In addition, a few more auxiliary switchboards were installed. For the most part the Siemen's make were used. As safety devices for the generators, relay devices were made for the following cases :

(i) Short circuit within the winding of the same phase.
(ii) Short circuit between the windings of different phase.
(iii) The ground connection or windings or lead-outs.
(iv) Excessive voltage.

In order to make the above mentioned safety devices complete, special transformers of the three winding type were installed ; and there are devices by which it is possible to examine the workings of the relays at will. In other words, by merely pushing the push button of the attached relays on the switchboard, it is possible to work the relays at the same time in case of generator accidents. At this instance, it is impossible to turn off the oil-filled cut-offs, so there is time to blow an alarm signal.

The main transformers are protected by differential relay› over-load relay, etc. Relays which operate at the time of generator, transformer and other accidents are shown by an auxiliary relay or lamp indicators, by which it is easy to detect the places where accidents ocçur.

The lightning rod is of the horn gap arrester type with an oil damping resistance, and it is placed outside. The transmission line of this plant is explained below.

(7) TRANSMISSION LINES.—The two transmission lines, No. 1 and No. 2 from the Power Plant No. 1 have two lines each. One of these lines connects the generator directly with the factory where electricity is used. The maximum height of the places where the transmission lines pass is 600 meters and the average height of the mountainous districts is about 200 meters.

The construction work of transmission line No. 1 was begun in the Spring of 1928 and completed in July 1929. Transmission lines, No. 2 and No. 3, were begun in September 1929 and are expected to be completed by September 1930.

Outline of Construction of the Power Plants Nos. 2 and 3

The construction of Power Plants, No. 1 and No. 2, which was only begun this year will be explained now.

The water discharge passage at Power Plant No. 1 is 482.21 meters above sea level and 5.8 kilometers in length. (Almost all the course is through a tunnel with on aqueduct bridge). Two iron pipe lines (A.G. Ferrum make, welded pipe) of a combined length of 473 meters, and an average inside diameter of 2.05 meters, was used to lead the discharged water to the water-wheel of Plant No. 2.

The grade of the water passage is about 1-1,000 and in the tunnel, it is planned to cover the pipe with a 1:3 plain concrete of a thickness-between 20 cm. and 30 cm. ; and where the rock bed is bad, reinforced concrete is to be used. The water tank will be constructed deep in the ground with a reinforced concrete cover. It will then be covered with earth to prevent if from freezing. The extra water passage of iron pipe with an inside diameter of 1.25 meters will be connected at the lower side of the Power Plant to the third water-way.

This Power Plant will be prepared as a semi-automatic type and can be operated by a push button in the switch-board room. There are two units of water-wheels and generators.

It has been decided that all the generators and water-wheels used in the Power Plant shall be home-made. It is interesting to note that the manufacturing industry of Japan has reached that stage where it is able to produce the high head reaction turbine of the Power Plant No. 2 which is of a size that is rarely used even in western countries.

The water wheel is of the vertical shaft spiral casing single discharge type, with an output of 31,000 H.P. r.p.m. 450, with a guaranteed efficiency of 89 per cent ; the increase of speed and water pressure between the 100 per cent. load on and load off is 20 per cent. and 15 per cent. respectively. When the load is put on the decrease of speed the water pressure is 24 per cent and 30 per cent. respectively.

The guide vane closing time is 2.5 seconds, over speed 1.8 times, and the oil pressure regulates the cast steel sluice valve. The draft tube is of the natural flow type, the maker's special vibrationless. The pressure regulator, which by experience is said to have the characteristic of capably discharging the water uniformly and smoothly, regardless of the load fluctuation, is used. The oil pressure system ; capacity in cubic meters per second, maker, Dengyosha.

The generators are of the vertical shaft total enclosed type 23,000 kVA., 450 r.p.m., 110 kVA., 60 cycles, 16 poles.

The guaranteed efficiency at the power factor of 90 per cent., at full load is 97,2 per cent. and the voltage regulation at the power factor of 90 per cent., at full load is 26 per cent. The weight of the rotor and shaft is 75.5 tons, total 152,5 tons, overspeed 1.8 times.

Furthermore, the generators are made in such a way as to be operated by themselves or in parallel. A damper winding is attached to every generator. An exciter is attached directly to the generator and has the capacity of 120 kW. The generator manufacturers are the Shibaura Engineering Works.

The transformers are of three phases, core type, outdoor, capacity 23,000 kVA., cooled by the oil circulation method. Together with the switch-board and oil switch, they were manufactured by the Fuji Electrical Machine Manufacturing Company.

Power Plant No. 3 takes in the water discharged directly from Power Plant No. 2, by a water tunnel of 6.1 kilometers and leads to the water-wheel by a single penstock of 205 meters long and 2.8 meters in the inside diameter. Besides the syphon type tunnel under the deep rock bed, at the bottom of the Shoko River near the Power Plant No. 2, and the two aqueduct bridges, the hole water course is of the tunnel type being the same as that of waterway No. 2. The water tank and the cooling water pipe equipment is also the same.

The Power Plant is of the full automatic type, while Power Plant No. 2 is considered as the motor station.

The water-wheel is of the vertical shaft, spiral casing, single discharge type. The guaranteed efficiency is 89 per cent. 100 per cent. load change, at load-off 21 per cent. increase in speed, and 15 per cent. increase in water pressure ; and at full load 24 per cent. decrease in speed and 37 per cent. in water pressure.

(Continued on page 140).

The Hulutao Port Development Project

[The following authoritative article on the Hulutao Project arrived too late for inclusion in the account of this enterprise which we published last month. It is now being published because it contains data elsewhere unavailable]

ONE of the most important enterprises that the National Government has recently proposed to undertake is the development of Hulutao into a commercial port. The Chinese people have long been cherishing the hope of having a port entirely of their own in the Gulf of Pechili, particularly in Manchuria. If the present scheme is to be successfully carried through, this aspiration will be realized before long. Among the harbors in this region, Hulutao possesses many excellent features.

As early as 1910 work was started to improve the harbor; but owing to various complications, it was suspended. But so far nothing except a portion of the breakwater was completed. The silting of Hai Ho which detracts greatly the usefulness of the port of Tientsin, the building of a network of railways in Manchuria by Chinese independently of the Japanese-owned South Manchurian Railway necessitated a separate outlet, the unprecedented scale of immigrants from the war-torn and famine-stricken districts to Manchuria and the congestion of the port of Dairen during the recent Chino-Russian conflict made the development of this port an immediate necessity. Therefore, not long ago a contract of G.$6,400,000 was awarded by the National Government to the Netherlands Harbor Works Company of Amsterdam to make the necessary improvements. While excessive optimism is not warranted, it is safe to predict that with a certain amount of careful management, the future port can be made to pay for the initial investment and whatever subsequent improvements may be necessary.

Hulutao is a promontory in the northern part of the Gulf of Pechili. It is located in N. 40° 44′ and 121° 1′ east of Greenwich. The west portion of the promontory is connected with the mainland and the south is used for port development depending upon a breakwater (that is to be built) on the south and southwest for protection against wind and tide. The port is ice-free in winter and cool in summer. It is visited mostly by the north wind in winter and southwest wind in summer. The average difference between high and low tide is about 12-ft. The highest tide in summer and the lowest in winter register a difference of 17-ft. The harbor can be made to accommodate deep-draft sea-going steamers without much dredging. It is located very near a coal producing region and is rich in economic possibilities.

The railway connection of this future port is excellent. It can now be reached by a short branch line of seven and a half miles from the Pei-ning Railway (formerly Peking-Mukden) south of the station Lienshan. Later it will be the terminus of the Chinchow-Aigun Railway. Through the system of lines now owned by the Chinese, it can tap practically all parts of Manchuria. A comparison with Dairen, in point of railway connection, to Mukden is as follows :—

	Hulutao	Dairen
To Mukden	301 Kilometers	397 Kilometers

When sufficiently developed the Hulutao Harbor may have a maximum berthing line of 44,000-ft. ample enough for 97 vessels with a length of 400-ft. and an annual cargo tonnage of 6,970,000. But when the present program is completed in five years and a half, there will be a berthing line of 8,800-ft. which is sufficient to accommodate 16 steamers of 400-ft. each. There will be plenty of anchoring space in the harbor. The following are the important engineering details of the project :—

I.—BREAKWATER

As has been mentioned before, a breakwater is needed to protect the harbor from wind and tide. It will consist of two parts, (1) the southern part of 4,100-ft. long and (2) the south-western part of 1,000-ft. long.

The Southern breakwater shall be composed of a foundation of pell mell rubble, dumped into a foundation channel, dredged to a depth of 35-ft. below H. Z., upon which will be erected a wall, consisting of concrete blocks for the lower part, which will be prepared on shore, and concrete monoliths for the upper part, built in situation lengths of 60-ft. each, separated by contraction and expansion joints, and with the top at 22-ft. above H. Z.

The blocks are to be placed on a bed of broken stone with concrete bags on both sides, in sloping bond at an inclination of 1 : 3.

Upon the monolith will be placed a reinforced concrete parapet on the seaward side, with contraction and expansion joints every 60-ft. and with the top at 30-ft. above H. Z. The rubblemound foundation is extended on both sides of the wall to form a berm covered with ½ to 1 ton stones, on the seaward side concrete blocks are placed on top of same.

The eastern part of the breakwater over a length of 1,000-ft. will be built without a parapet and with the crest at a level of 18-ft. above H. Z.

The western part over a length of 2,100-ft. will be of similar but lighter type and a backfilling with pell mell rubble covered by a layer or quarry spalls shall be provided for.

The top of the monoliths shall be at 22-ft. above H. Z. and that of the parapet 30-ft. above H. Z.

The east end of the breakwater shall be supported by a laisson made of concrete blocks, the slope of the rubblemound will be flattened and concrete blocks placed on the inner and outer berms.

(2) The south-western part will be similar to the most western part of the southern breakwater.

II.—QUAYWALL

The quaywall, with a total length of 3,700-ft. consists of three parts with lengths of respectively 800, 1,800 and 1,700-ft. At the eastern end of the southern quaywall a connecting wall will be constructed between the quaywall and the breakwater.

The construction of the quaywall and the connecting wall will be similar to that of the western part of the southern breakwater. The foundation channel shall be dredged to a depth of 35-ft. below H. Z. except where the bottom rock is above this level. The part of 1,700-ft. shall be made with a foundation to a depth of 40-ft. below H. Z. and the lower part of the quaywall to consist of one more layer of concrete blocks. The quaywall will have a coping of concrete with contraction and expansion joints every 10-ft. the face to be protected by fenders of hardwood. Five flights of stairs are to be spared in the monoliths and 20 iron ladders and 5 bollards have to be secured.

III.—CONSTRUCTION PIER

The construction pier consists of a rubblemound with slopes of 1 : 2, and : 1½, and shall have a total length of 900-ft.

A foundation channel shall be dredged over a length of 250-ft. from the end of the depth of 18-ft. below H. Z. The rubblemound consists of pell mell rubble mixed with 20 per cent. of quarry refuse and the material obtained from the excavation Pan Lan Shan and Kao Liang Tou To may be used, the outer slope and the crest shall be covered by stones of ¼ to 1 ton, the inner slope by stones of 2 to 5 cwts.

IV.—RETAINING DIKES

The retaining dikes within the harbor shelter situated to the north of the construction pier, shall have a total length of 2,360-ft. and shall consist of a rubblemound of pell mell rubble mixed with 30 per cent. of quarry refuse with slopes of 1 : 2 and 1 : 1 covered by a layer of quarry spalls on the inner slope and by a layer of stone of 2 to 5 cwts. on the outer slope.

The retaining dike to the west of Pan Lan Shan shall have a length of 2,500-ft. and shall consist of a pell mell rubblemound with a seaward slope of 1 to 3 and a berm with a width of 10-ft. at the level of 5-ft. above H. Z. This slope shall be covered by a 5-ft. layer of ¼ to 1 ton stones; the inner slope is 1 to 1½, covered by a 3-ft. layer of quarry spalls.

Above the level of 15-ft. above H. Z. a concrete wall shall be made with contraction and expansion joints every 60-ft. and surmounted by a reinforced concrete parapet from 22-ft. to 27-ft. above H. Z.

At the north-western end, where a concrete wall has already been made up to a level of about 18-ft. above H. Z., over a length of 450-ft., only a seaward slope shall be made, and the concrete wall with the parapet wall shall be made on top of the existing wall.

The retaining dike limiting the reclamation of the mudflat, shall have a length of 2,100-ft. and shall be constructed of consistent clay or mud, the outer slope to be covered with a layer of rubble on a bed of brushwood.

V. DREDGING OF HARBOR BASIN AND AN ENTRANCE CHANNEL

One area is to be dredged to a depth of 27-ft. below H. Z.
One area is to be dredged to a depth of 32-ft. below H. Z.

The entrance channel is to be dredged to a depth of 30-ft. below H. Z., and with a width of 650-ft. in the bottom for a distance of about 2,500-ft. until it reaches a point where the sea bottom is 30-ft. below H. Z., all slopes to be 1 : 2.

VI. RECLAMATION OF LOW GROUNDS AND A PART OF THE FORESHORE

The reclamation of a part of the mudflat, the fore-shore and the filling between the breakwater and quaywall shall be done to a level of 22-ft. above H. Z. The material dredged from the harbor basin, entrance channel and foundation channels will be used for this work as well as the material obtained from the excavation of Pan La Shan and the Kao Liang Tou To which will not be required for the construction pier and retaining dikes.

VII. EXCAVATION OF PAN LA SHAN AND KAO LIANG TOU TO

The excavation of Pan La Shan and Kao Liang Tou To shall be done to a level of 22-ft. above H. Z.

As has been mentioned before, the contract time for the above work will take five years and a half ; but it is expected that the harbor will be ready for use long before the time set for the completion of the work probably in two or three years' time from now. While engineers, labor, equipment, material and supplies are to be furnished by the contracting company, the Government on its part has appointed Mr. Y. M. Lin as the Director of the Hulutao harbor work upon whom shall rest the responsibility of checking the work completed by the contracting company to see that it is properly performed, to make the necessary changes in the stipulations of the contract, to make the periodical instalment payments to the contractor and to supervise over sundry other matters.

Dutch Building Many New Vessels for East Indian Trade

THE Netherlands merchant marine has been strengthened during 1929 by the addition of 23 steamers of 107,940 gross tons, and 15 motorships of 55,060 tons, while on the other hand, 11 steamers of 36,960 have been sold, broken up, or lost, so that the net addition of steam tonnage, *viz.*, 12 units and 70,980 gross tons, is over 15,000 tons in excess of the new motor tonnage added, the completion of the Holland-Amerika liner *Statendam* having, of course, favorably influenced the share of steam tonnage. Eleven vessels of 38,200 tons were constructed in Netherlands yards, as were 13 motorships of 39,060 tons.

The choice of Netherlands owners appears to be shifting rapidly in favor of diesel tonnage ; at the end of 1929 there were only 14 steamers, of 37,100 gross tons under construction, but 35 motorships of 216,150 gross tons. A substantial share of the diesel tonnage now building is for account of the East Indian liner companies, which have already acquired a very considerable amount of diesel tonnage. This having proved satisfactory, the companies are eager to increase their diesel tonnage.

The Java-China-Japan line has ordered two motorships (7,600 tons gross) and the Koninklijke-Nederlandsche Stoomboot-Maatschappij, who, before the war, employed a number of comparatively small motorships, have ordered a large motorship (8,700 tons) for their Amsterdam-Indies service. The same owners have also ordered three small steamers (1,750 tons) from German builders.

Owners engaged in general trading are sticking to steam tonnage, two steamers of respectively 6,000 and 2,000 gross tons being under construction in the United Kingdom for owners in this class, and the Indian Packet Co., while having placed orders for a considerable number of motorships of between 500 and 900 gross tons, are still preferring steam engines for vessels of moderate size.

The Nederland Steamship Company has taken over from builders the two last units of the *Poelau* class (9,250 gross tons) and has now developed a design for a somewhat smaller " T " type (8,650 tons), the length of which has been increased by five feet, after the advantages of the greater length than provided for in the original design had been proved by model tests at the National Physical Laboratory's experimental tank, Teddington. Seven vessels of this new type have been ordered, and British builders have secured orders for two units ; all are to be propelled by Sulzer engines, and in one case the engine will be double-acting.

Two new passenger motor liners of about 19,000 tons each, ordered in 1928, have been launched. Both vessels will have ten-cylinder Sulzer engines, and have a speed of 18 knots, but while the machinery for one ship is constructed at Winterthur, the other will have Schelde-built engines. The higher speed compared with the previous motor liner *Christiaan Huygens* (17 knots) and with the French-built motor liner *Pieter Corneliszoon Hooft* (15 knots) will enable the owners to reduce the duration of the voyage, but the inability of the French-built unit to keep schedule of the later vessels has made the owners decide to take out her engines, consisting of two eight-cylinder Sulzers of 4,000 shaft h.p. each and cylinders of 760 mm. bore and 1,240 mm. stroke, being the same as for the 10-cylinder units in the latest ships. The increased power and a lengthening of the foreship by eight feet, which is to be carried out at the same time, will increase the speed by about two knots. The oil engines will be installed in cargo units.

The Rotterdam Lloyd has taken over one cargo liner of the *Kota* class (7,200 tons) ; three vessels of this type are still in the hands of various builders in Holland, and one of these is to be fitted with fast M.A.N. diesels and mechanical reduction gearing, a novel experiment the results of which will be eagerly awaited. One of the two new 18,000-ton motor liners has been launched at Rotterdam, the construction of the other is being curtailed, as it will be impossible to bring her out from the builders' yard at Flushing before the new locks at that port are ready. Both vessels will have Schelde-Sulzer diesel engines.

The Holland-Amerika Line flagship *Statendam* is one of the most efficient steamers afloat, her consumption of boiler oil being .61 lbs. per shaft h.p. for all purposes. The owners have now decided to re-arrange the passenger accommodation on the Rotterdam to the Statendam plan.

The last important vessel to be launched in the Netherlands in 1929 was the new motor vessel *Marnix Van Sint Aldegonde*, built by the Netherland Shipbuilding Co., Amsterdam, and christened by H. R. H. Princess Juliana. This ship and her sister, the *Johan van Oldenbarneveldt*, which was launched a few months ago from the same yard, have been designed by Visker & Prins, of the owners' technical staff. They are of 611 feet 10 inches overall length, 74.1 inch molded breadth, and 73.8 inches depth from keel to A deck, their loaded displacement being 25,400 tons. Accommodation is provided for 370 first, 281 second, 64 third and 60 fourth-class passengers, while the crew of each numbers 344 hands.

Two Schelde-Sulzer diesel engines of 7,000 shaft h.p. each, will give her a speed of 18 knots. The contract for the two ships was signed on April 30, 1928, the keel of the second vessel was laid on December 8, 1928, and she will be ready to sail on her maiden voyage on October 7, 1930. The first vessel will be ready to sail on her first trip on May 6 next.

The Netherland Shipbuilding Co. has three " T " type cargo motorships ; on the vacated berth the keel will be laid for the motorship *Tjinegara* for the Java-China-Japan line, and of each of these two types of vessel one more is to be laid down as space becomes available.

The Fusenko Hydro-Electric Power Plant

(Continued from page 138).

Other details are similar to those of Power Plant No. 2.

Water wheel necessaries, devices to regulate the water levels, other automatic instruments, and other safety devices, have been equipped. They are of the Dengyosha make.

The generators are of 20,000 kVA. ; 277 r.p.m. ; other specifications are the same as those for Power Plant No 2.

The transformers are of outdoor, oil-cooled, single-phase, 4 units of 6.666 kVA.

The completion of Power Plants No. 2 and No. 3 is expected by October, 1930.

Total Cost of Construction (estimated)

Power Plant No. 1	Y.34,700,000	Transmission Lines	2,700,000
Power Plant No. 2	4,000,000	Overhead Expenses	5,000,000
Power Plant No. 3	3,600,000	Grand Total	Y.50,000,000

Engineering Notes

ELECTRIC LIGHT, POWER AND TRACTION

ELECTRIC MACHINERY TO BE BOUGHT IN THE NEAR FUTURE.—The following companies will invite the estimates for the following machinery in the near future.

Company	*Machine*
Ina Denki Tetsudo K.K.	Equipment for Akao 200 k.w. substation.
Oyodogawa Denki K.K.	Cable, High Tension Insulater, Steel Pole for transmission line.
Taiwan Denryoku K.K.	32 units of Distance Riley (?) etc.
Sanshin Tetsudo K.K.	Rotally and liquid silver regurater.
Tokyo Dento K.K.	Transformers on the pole.
Toho Denryoku K.K.	Petelzen coil (14)
Miye Godo Denki K.K.	Petelzen coil with big capacity.
Rijiri Seuden K.K.	1,000 k.w. generator.
Mitsukoshi Gofuku Ten	Electric refrigater and *Diesel generater*
Department of Railway	Illuminators.

SHINANO ELECTRIC COMPANY.—The Shinano Electric Company, capitalized at Y.17,000,000, is supplying electric light and power to two big cities, 10 towns and 26 villages. The power plants of the company can supply 28,000 kilowatts of electric current.

The company was first founded at Suzaka-machi, Nagano Prefecture, in May, 1913, on a capital of Y.200,000, and at first it supplied electricity to Suzaka-machi and neighbourhood, establishing the power plant at Nireimura. The company gradually absorbed many electric light companies and increased the capital to Y.17,000,000. The company is running carbide factories at Kashiwabara and Yoshida on the Shin-etsu Railway.

INDUSTRIAL

AMERICAN-JAPANESE OIL COMPANY FORMED BY MITSUBISHI, TIDEWATER.—A benzine producing company under joint Japan-American management has come to existence in Japan with a capitalization of Y.5,000,000, equally borne by the Mitsubishi Shoji Kaisha and Tide Water Oil Company and the Associated Oil Company. Negotiations were given the finishing touches by Mr. Mitani, president of the Mitsubishi Mining Company, while he was staying in America recently. The production of 7,500,000 gallons a year is sought by the company.

A factory will be erected at Tsurumi near Yokohama and products sold exclusively by the Mitsubishi Shoji Kaisha. The company's president and managing-director will be appointed from among the Mitsubishis and vice-president from among the American concern. Crude oil and technique will be supplied by the Associated Tide Water.

FUSHUN VOLATILE OIL.—The new *Fushun Oil Shale Plant* has discovered a new bi-product from an altogether unlooked-for quarter.

Through the endeavours of Dr. Okinaka and his assistants in the Laboratory, volatile oil valued at Y.100 per ton has been made extractable to the amount of about 8,000 tons a year in the process of extracting crude paraffin from the crude shale oil.

The new Oil Shale Plant is planned to put out 73,000 tons crude oil from 1,380,000 tons shale heretofore thrown away as mere waste, from which 59,000 tons heavy oil may be obtained, besides 18,000 tons sulphate of ammonia, 14,000 tons crude paraffin, and 5,000 tons coke.

By reason of this new discovery, the unlooked-for profit from this source will total about Y.800,000 a year.

8,000 tons a year are said to be a conservative estimate which may be technically raised to 13,000 tons.

SHOWA STEEL WORKS.—The question of whether the Government will allow the South Manchuria Railway Company to establish its projected Showa Steel Works was discussed at the conference of Dr. Sengoku, Governor of the S.M.R Co., Premier Hamaguchi and other Cabinet Ministers at the Premier's official residence recently.

The gigantic project was made when Mr. Jotaro Yamamoto was the head of the S.M.R. Company, but was not approved by the present Ministry on account of its retrenchment policy. The company having already purchased machinery and other materials for the projected steel works, it is learned that the Government will permit the establishment of the plant.

The question of whether it is advisable to locate the steel works at Shingishu (New Wiju) in Chosen or at Anshan in Manchuria was discussed at the conference, but no decision was reached. Shingishu is favoured as the output from there can be sent to Japan free of duty while a duty is imposed on the output supplied to Japan from Anshan. In respect to relieving the unemployment of the Chosenese, Shingishu is better situated. The conference decided to make a further study of the pros and cons of establishing the steel works at Anshan or Shingishu. In addition to Premier Hamaguchi, the meeting was attended by War Minister Ugaki. Foreign Minister Shidehara, Finance Minister Inouye and Overseas Minister Matsuda.

SOCONY CANDLE PLANT AT POOTUNG. The new Pootung candle factory of the Standard Oil Company of New York commenced operations recently. The new plant replaces the old ones at Hankow and Tientsin.

The design for the new plant is the work of Mr. E. H. Staber and the Operating Division of the Oil Company, and includes many new innovations which are necessary for an efficient and *scientific candle manufacturing factory*.

One important innovation is the location of the mixing tanks on the ground floor from which place the stock is pumped direct to the moulding machines on the top floor. The old, and now obsolete practice, involving gravity flow to the moulding machines, necessitated an extra floor above as well as expensive heavy construction throughout in order to carry the great weight in *the tanks at the top of the building.*

Another innovation, at least as far as the candle plants of the Mei Foo company operated in the Far East are concerned, is the method of obtaining steam for melting purposes. The old Mei Foo Tientsin and Hankow factories had their own independent steam plants, while the Pootung factory utilizes exhaust steam exclusively from the new central plant. The new method is definitely more economical than the old one.

Centralization of tanks shortens pipelines, reduces radiation and simplifices control, operation and supervision. To reduce steam consumption to a minimum, all pipes and tanks are very effectively and efficiently insulated. The temperatures of waxes and mixtures of waxes and stearine are automatically controlled by thermo controlled valves. The use of well water will permit of an operating period of from 10 to 12 months per year as compared with the short operating period allowed at Tientsin and Hankow factories. It is also the hope of the management of the candle factory that a very material reduction will be made in the quantity of cooling water required for candle moulds by the use of thermo controlled valves.

Improvements in handling the finished product have also been provided by the inclusion of gravity roller conveyors which carry the filled boxes from the packing tables on the top floor to storage on the ground floor.

The construction of the building for the new plant is of the most up-to-date factory design with ample window space providing the maximum light and air possible.

Mr. E. Lang, who was in charge of candle manufacture at Hankow supervised the installation of the machinery and equipment and is superintendent of the new factory.

TOYODA AUTOMATIC LOOM CO. SELLS PATENTS IN ENGLAND.—Platt Brothers & Company, Oldham, England, have secured Continent and England rights for the manufacture and distribution of Toyoda automatic power looms, it has been disclosed. Mr. Shosaku Suzuki, expert engineer of the Toyoda Automatic Loom Company of Nagoya, owners of the patent rights for the textile machinery in all the important industrial countries of the world, left for England.

The Toyoda automatic loom is looked upon by the world's leading textile men as the biggest factor in Japan's ascendancy in international markets for cotton piece goods not alone in China but in India, South Seas region. South Africa, along the Mediterranean sea and the Balkans. The machinery is now recognized as one of the most efficient for weaving shirting, sheeting, jeans and all other descriptions of cotton and cotton mixed fabrics. Per man output of the loom is greatest while the run of quality is incomparable. Pratt Brothers, the British lessees of the Toyoda patents, are probably the biggest ufmanactures in the world of cotton spinning mill machinery and equipment. Of the 7,000,000 spidlesn now installed in Japanese spinning mills approximately 80 per cent. or 5,600,000 spindles come have from their machinery plants.

RAILWAYS

TOKYO-OSAKA SUPER-SPECIAL EXPRESS SERVICE.—The recent trial run of the Tokyo-Osaka super-special express train has given amazing results, leading to a conclusion that the existing rail track is amply capable of withstanding the extra strain of the new express thereon. As the result, the Railway Ministry has decided to inaugurate the new service between April and July next, and for that purpose Y.316,000 for the inauguration of the new service and Y.31,000 for the special maintenance has been arranged to be included in its estimate for the next fiscal year. The time table and other details remain to be studied.

KAWASAKI MAY BUILD C.E.R. BRIDGE. —It is expected that the Kawasaki Dockyard Company of Kobe will undertake the construction of the big iron bridge of the Chinese Eastern Railway across the Sungari.

Hitherto the Chinese Eastern Railway has entrusted the execution of large enterprises to foreign firms other than Japanese, but the locomotives supplied by the iron works of the Kawasaki Dockyard Company last year having proved most satisfactory, the railway authorities intend to assign the bridge construction to the Kawasaki company, it is reported, the cost will be about Y.2,300,000. Work will start with the Spring thaw.

SHIMONOSEKI UNDERSEA RAILWAY TUNNEL.—With the feasionity of constructing an undersea railway tunnel across the Kanmon Strait between Honshu and Kyushu new regarded a certainty, after nearly three years of careful geological survey and an expenditure of Y. 800,000, the Railway Department is expected to start planning for the building of the tunnel this year. Actual engineering work, however, will not commence until 1931.

The tunnel will be built at an estimated expenditure of 25 million yen and will be completed within five years. It will be a little over 2.3 miles in length, 22 metres deep, and about 5.80 metres wide.

At present connections between the Honshu and Kyushu railways are maintained by scows, each carrying six freight cars. On stormy days scores of cars are tied up at both Moji and Shimonoseki because of the difficulty of navigating the scows across the rough waters. In view of the increasing freight between Kyushu and Honshu, a tunnel is regarded as the only means of alleviating the freight congestion.

GRAIN ELEVATORS AT DAIREN.—The announcement that grain elevators are to be installed shortly at Dairen, which will be the first to be used in Manchuria, reminds one that such elevators were planned for the Chinese Eastern Railway and at Egersheld as far back as 1922. For in that year the railway concluded a contract with a large British concern for erection of several of them. On account of the change of management in the C.E.R. and the taking away of Egersheld, the contract fell through. In the meantime the South Manchuria Railway, not to be left behind by the C.E.R., allotted a large sum to be set aside for the installation of elevators, and sent several engineers to Europe, America, and Canada to obtain firsthand knowledge on this subject. When it was learned that the C.E.R. contract had fallen through, the Japanese did not hurry matters, so that nearly five years have elapsed before the first installation has made its appearance. Others are to be installed by the S.M.R. along the railway line and Changchun is to have an installation of large capacity, so as to handle promptly the large quantity of beans arriving from the C.E.R. It is high time that the C.E.R. should give the matter their earnest consideration and earmark a large sum of the yet-to-be-earned railway profits for the purchase of these grain-elevators.

BRANCH RAILWAY FOR CHINKIANG.—To facilitate the transportation of freight into and out of Chinkiang, the Ministry of Railways has decided to construct a branch line connecting the river-front station at Chinkiang with the Chinkiang Customs House. The fund for this construction amounting to about $30,000, will be appropriated from the 1930 surplus of the Shanghai-Nanking Railway.

The merchants at Chinkiang have been greatly inconvenienced by the fact that goods have had to be transported by boat between the Chinkiang Customs House and the present river-front station, and during dry seasons when the water is low, boats find it very difficult to dock at the river-front. It is estimated that more than 100,000 tons of goods have to be re-shipped in this manner every year. If a branch line is constructed along the river-front there will be annual increase of 20,000 tons of goods going into Chinkiang and about 60,000 tons of goods exported from that port.

PUBLIC WORKS

NANKING CITY DEVELOPMENTS.—The first half of the 19th Year of the Republic (1930) will see a number of civic improvements and new constructions started in the capital. The programme of the Special Municipal Government of Nanking provides for the following construction work to be begun early this year :

1.—A modern waterworks system.

2.—Installation of rail-less tram-cars on the Chungshan Memorial Highway and its main branch streets.

3.—Opening of an isolation hospital and a large public recreation ground.

5.—Opening of additional free schools for the poor and night classes for the workers.—*Kuo Min.*

NEW MANILA DREDGE.—The contract for the purchase of a dredging machine to be used by the public works bureau in dredging the Manila harbor and parts of the Pasig river was awarded by Francisco Segado, insular purchasing agents to F. Schichau, local representative of Reither, Ackerman and Company, a London concern, following the recommendation to this effect made by A. D. Williams, director of public works.

The cost of the new dredge is P.410,000. The new dredge will be larger than the old dredge at present being used by the public works bureau in the Pasig river. The contract includes an additional sum of P.60,000 for bringing the dredge from London to Manila.

According to the terms of the contract, the dredge must reach Manila within 100 days from the signing of the contract. The new dredge is powerful and more speedy than the ones now in operation here.

SHIPPING AND SHIPBUILDING

N.Y.K. JAPAN-LONDON PASSENGER LINER.—The *Terukuni Maru*, the first of two similar passenger liners for the service of the Nippon Yusen Kaisha between Japan and London, was launched on December 19 from the Mitsubishi Zosen Kaisha. This ship is of 11,800 tons gross and is 526 ft. long overall, with a beam of 64 ft. and a depth of 37 ft. The draught is 28 ft. 6 ins. Twin-screw ten-cylinder Sulzertype machinery will be installed, constructed under licence in Japan by the Mitsubishi Zosen Kaisha. Each motor will develop 4,800 b.h.p. and have cylinders 680 mm. bore with a piston stroke of 1,200 mm. The revolution speed will be 110 per minute.

Accommodation is provided for 125 first-class, 69 second-class and 60 third-class passengers, whilst 10,000 tons of cargo will also be carried. The trial trip speed of the *Terukuni Maru* and her sister ship *Yasukuni Maru* will be 16.75 knots.—*The Motor Ship.*

WHARF RAILWAY AT NAGASAKI.—The extension of the Japanese Government Railway from the Nagasaki Station to the Dejima Wharf where the " Express boats " berth has just been completed. This extension will be used on the arrival and departure of the N.Y.K. Express liners only—*Nagasaki Maru* and *Shanghai Maru*. On the sailing date of one of these steamers for Shanghai, the express train from Tokyo arriving at Nagasaki Station at 7.30 a.m. will be extended to the wharf, and, when the steamer arrives from Shanghai, the express train that leaves Nagasaki for Tokyo at 2.40 p.m. will start from the wharf a little earlier, and after a few minutes' stay at Nagasaki Station will proceed on schedule time. The new station is called Nagasaki Ko Eki (Nagasaki Port Station), and the office being in the same building as the N.Y.K. Ticket Office, great convenience is afforded passengers, as they can arrange for their further itinerary within the wharf compound.

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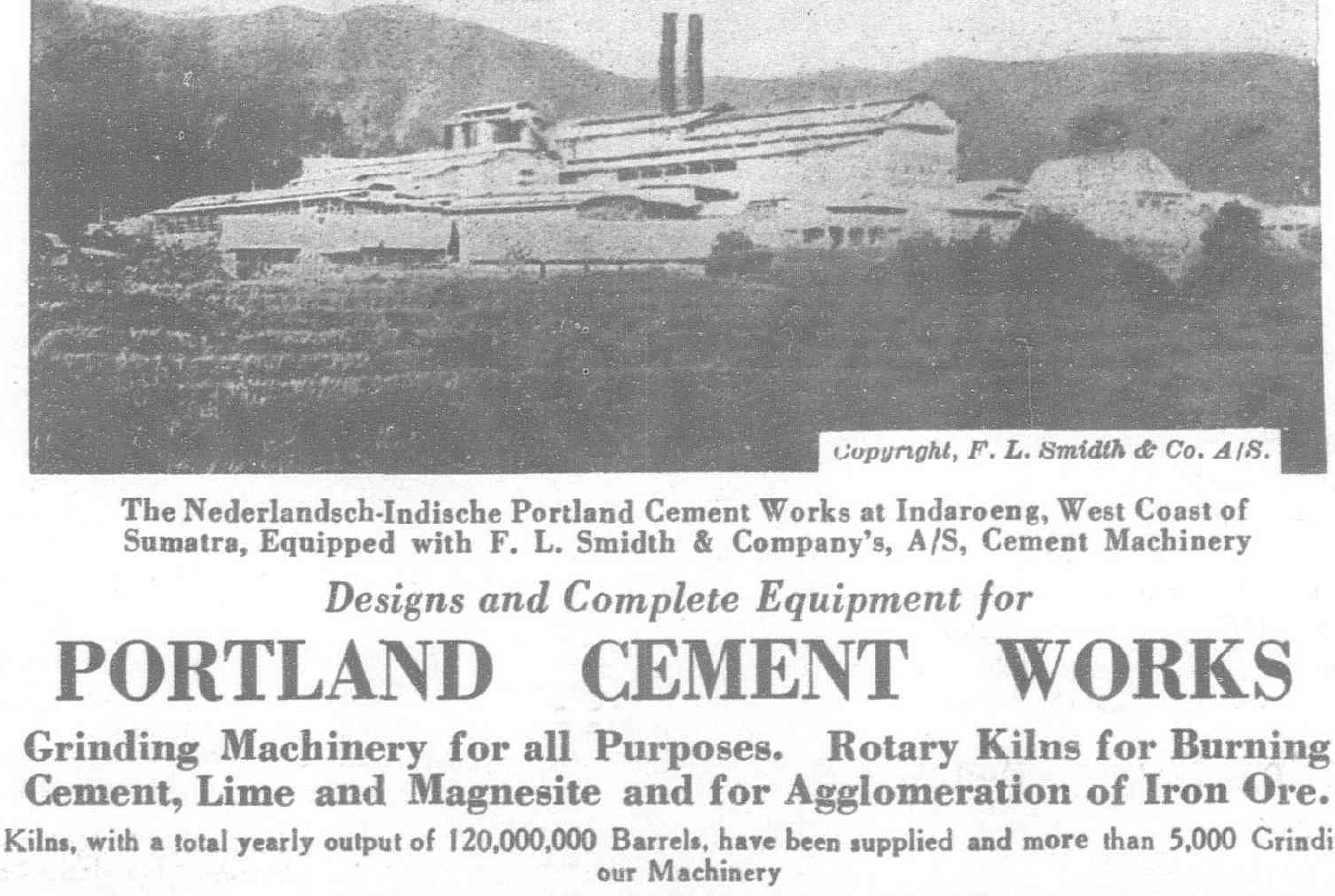

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TELEPHONE, TELEGRAPH AND RADIO

DOLLAR CO. OBTAINS GRANT FOR WIRELESS.—With the grant recently of the application by the United States Federal Radio Commission, the offices and the ships of the Robert Dollar Company throughout the world will be linked with radio services.

The application which asked for changes of power, frequency and allocation in order that the company may be enabled to carry out its radio contract with the Chinese government, was granted by the commission February 25, according to reports received here recently.

The contract between the Chinese government and the Dollar Company, providing for the use of the Route Ghisi transmission station, was signed last June. Under the terms of contract, the government pays the entire cost of the installation of the transmission plant, which represents more than G.$8,000, while the Dollar Company deposits 95 per cent. of the total cost which is to be refunded on expiration of the contract. The latter is also required to pay to the Chinese government $6,500 as royalty annually.

The station will be operated by the Chinese government and the Dollar Company is to pay a fixed sum of money monthly for use of its facilities. The Chinese government reserves the rights to use this station for its own purposes and private messages of all kinds to passengers at sea. It is further provided that the government may cancel the contract any time with four months notice.

ROADS

NEW ROADS IN NORTH CHINA.—Plans for the construction of a network of 13 motor roads linking a number of the more important and populous districts in the province of Suiyuan with a total mileage of about 940 miles as a means of providing employment for the large number of able-bodied adult famine refugees in the Northwest as well as to facilitate communication in the province, have been announced by the Suiyuan Provincial Department of Reconstruction. The total construction cost is estimated at about $700,000, which, it is hoped, will be appropriated by the Central Government in accordance with the petition of the provincial authorities.

Following is a list of the proposed roads, their lengths and the estimated cost of construction :—

Name of Highways			Length	Cost of Construction
Paoning Highway	..	..	520 li	$112,320
Suihsin Highway	..	..	540	131,240
Suitsing Highway	..	..	240	86,400
Paokeh Highway	..	..	350	75,600
Tungtien Highway	..	..	20	4,120
Kueiwu Highway	..	..	90	19,440
Taotsoh Highway	..	..	70	5,120
Lungwu Highway	..	..	350	85,680
Suijen Highway	..	..	125	27,100
Tsohliang Highway		..	170	36,720
Kupao Highway	..	..	140	30,240
Wuku Highway	..	..	142	30,672
Wuniao Highway	..	..	50	10,800
Total	..	..	2,807 li	$665,352

—*Kuo Min.*

MINING

ANHUI COAL MINE.—Preparations for the opening of the coal mines at the Huaiyuan District, west of Pengpu in Northern Anhwei, having been completed, it is announced by the National Reconstruction Commission that work was to have been commenced on March 15.

It is expected that the preliminary excavations will require one year to complete following which, it is estimated, a daily output of 300 tons will be obtained. To facilitate transportation of the coal, extensions of the Tientsin-Pukow Railway from Pengpu and Huaiho to the mining area will be constructed. The Commission is also planning to construct a road directly connecting Hofei with the Yangtze River.—*Kuo Min.*

AVIATION

JAPANESE TEST FLIGHT TO SHANGHAI.—Favored by a good following wind and moderately good weather the first test flight of the Japan Aviation Co.'s Dornier-Wahl seaplane was successfully accomplished on March 7 between Japan and China. The flight from Fukuoka to Shanghai was completed in the record time of 4 hours 51 minutes.

This particular type of machine has accommodation for twelve passengers, but on the flight yesterday she only carried a mechanical crew of five and a pilot, due to the fact that the crossing was more in the nature of a test.

The plane took off from Fukuoka a 7.49 a.m. and landed in the river at 12.38 covering the distance of 910 kilometres at an average speed of 100 miles per hour.

Three steamers were passed in the crossing and there was little chance of disaster under the circumstances, said Mr. Fujimoto.

OBSERVATORIES FOR AVIATION LINES.—The Ministry of Education of Japan has decided to establish seven new meteorological observatories in various sections of the country at a cost of Y.460,000 to facilitate the air service. The plan is due to a consideration that service to guide airplanes has been insufficient during the past few years.

The Ministry proposes to establish observatories near the important aviation fields and at the dangerous points on aviation courses. The sites are the mouth of Kitsugawa in Osaka; a point near the Najima Aviation Field close to Mt. Hakone ; Suzuka in Miei prefecture, Mt. Ibuki in Shiga Prefecture, Tomiye in Nagasaki Prefecture and Iwahara, also in Nagasaki Prefecture.

These observatories are to be operated under the Central Meteorological Observatory in Tokyo and will report on atmospheric conditions in high altitudes. These reports are to be distributed to the army and navy air services and all aviation fields. When the project is realized it will prove a benefit to Japan's aviation.

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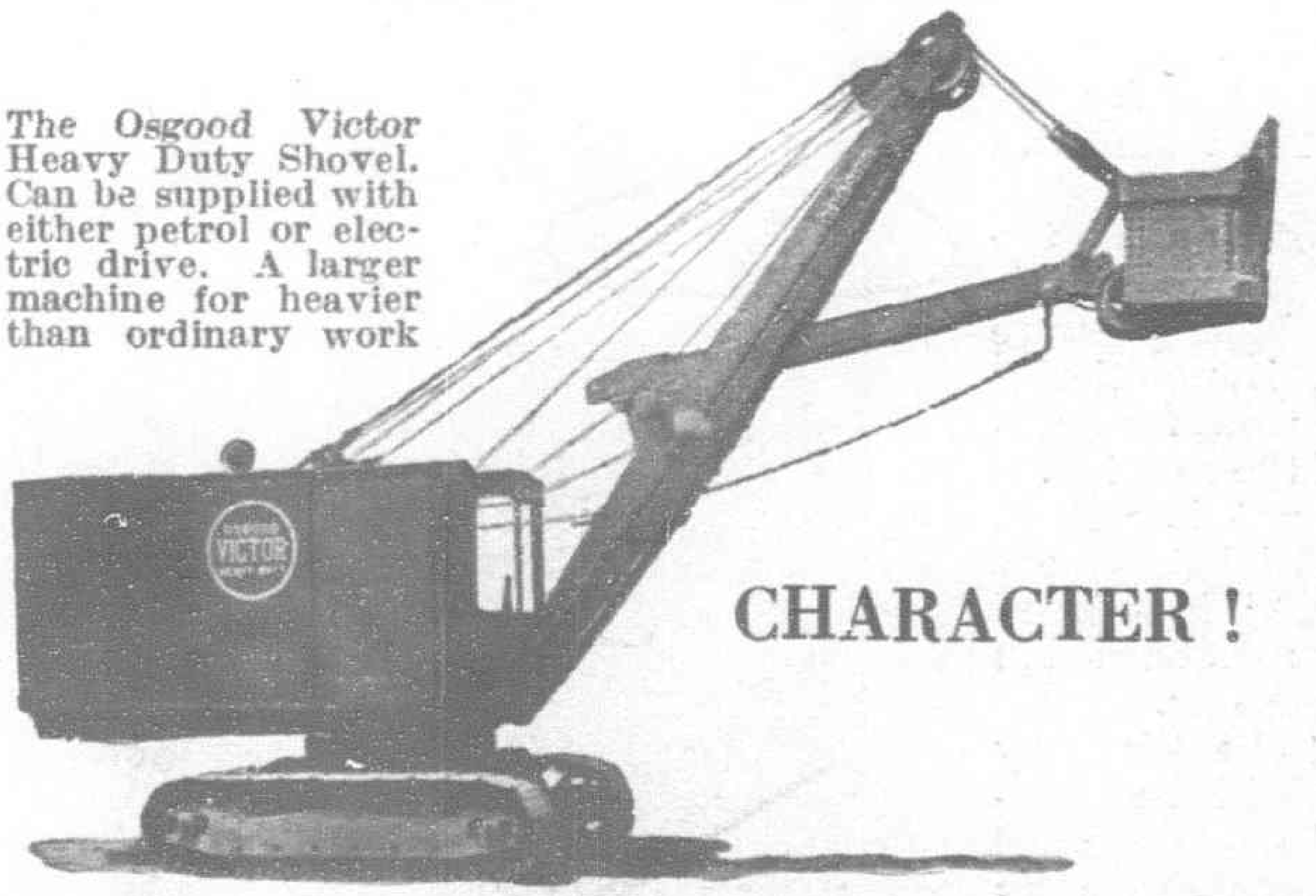

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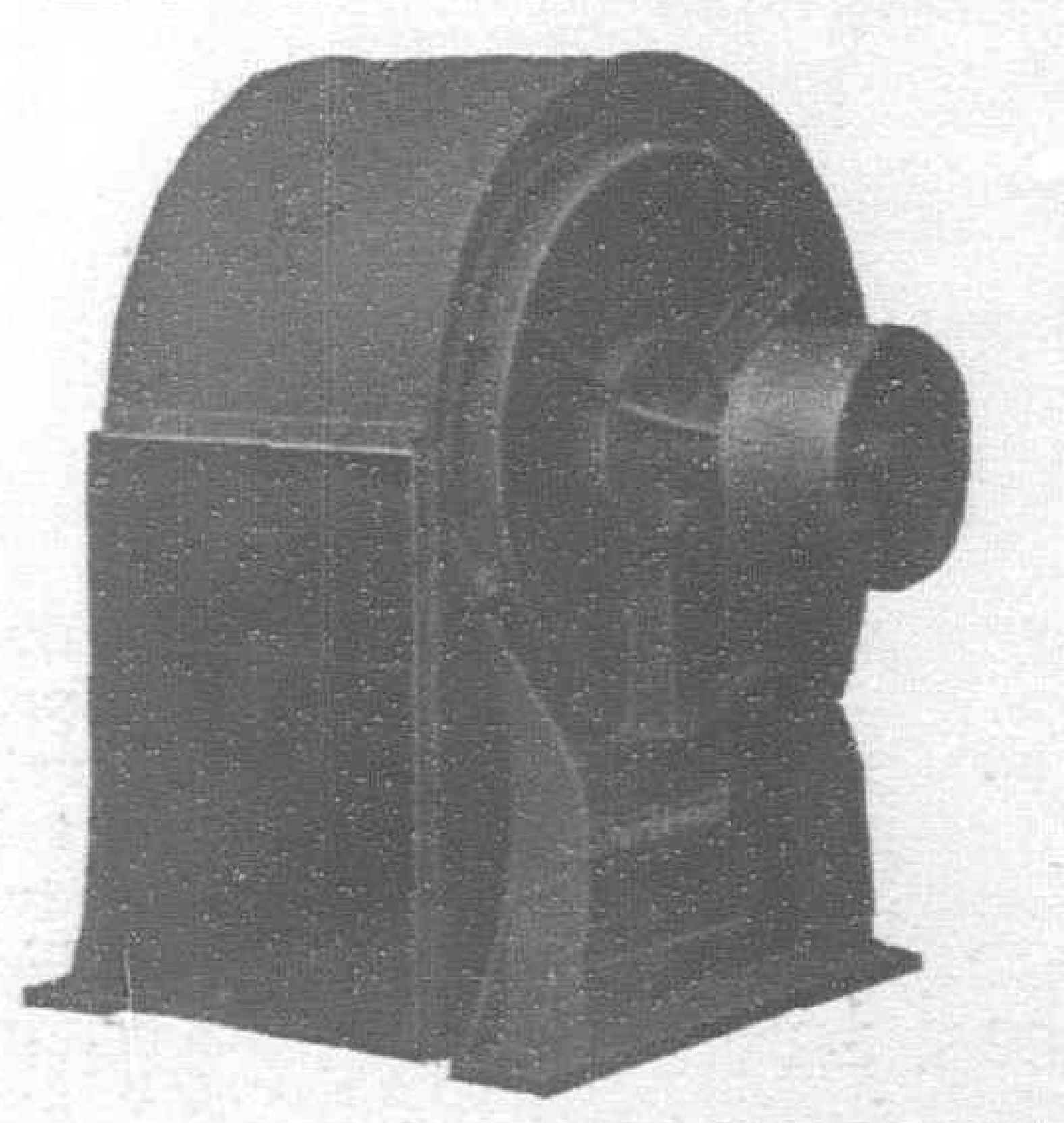

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MOTOR CARS

AUTOMOBILES IN HONGKONG.—During the past few years the number of passenger cars and busses operating in Hongkong has increased about 10 per cent. annually, but the number of trucks and motor cycles has remained practically stationary; the registrations on January 1, 1929, include 1,452 passenger cars, 291 trucks, 133 busses, 27 fire appliances, and 476 motor cycles.

The American share of total registrations, despite the tendency of British subjects to favor British cars and despite the campaign to buy British goods, was 66 per cent. of the passenger cars and 67 per cent. of the trucks. On the other hand, only 28 per cent. of the motor cycles and 36 per cent. of the busses are of American make. In the case of the busses, however, the predominance of British makes is due to a tendency on the part of the police authorities during the past few years to limit licenses for busses or taxicabs to vehicles of British manufacture. There is no provision in local ordinances forbidding the use of non-British busses, but the police authority has nevertheless used its power in favor of the British vehicle.

TRADE NOTES

Williams' New Pipe and Fittings Tongs, "Vulcan Superior"

J. H. Williams & Co., Buffalo, N. Y., ("The Wrench People") have just introduced their "Vulcan Superior" Chain Tongs for universal service on *both* pipe and fittings—*two* tools in *One*. Two tools as commonly used (one for pipe and one for fittings) are unnecessary.

The "V" recess in the jaws assures quick and positive grip on fittings. Since "Vulcan Superior" can be used instantly on *either* pipe or fittings they are said to be the perfect tongs for steamfitters. No stopping to alter the tool itself. No parts to lose. Equally efficient, without any change whatever, for both pipe and fittings service.

It is claimed "Vulcan Superior" is the only chain tongs on the market with reversible pipe and fittings jaws. When the teeth first in use wear, simply turn the jaws end-for-end. Double length of life; in effect, two tools at the price of one.

The Chains, either Flat or Cable type, lock easily and positively. Each Flat Chain is proof-tested and is *certified*, assuring safety to the operator.

Literature will be supplied by J. H. Williams & Co. on request.

Oriental Contracts Placed in Great Britain

(From our London Correspondent)

The Japanese Government has recently placed an order with Messrs. Yarrow & Company, Limited, of Glasgow, for a land type Yarrow bolier, of 1,000 lbs. pressure, and a steam temperature of 800 degrees Fah. The principal parts will be made at the Yarrow Works and shipped to Japan, where the boiler and superheater will be tubed.

A new 60,000 kW. hydro-electric power station is to be erected by the Nippon Denryoku K.K. in Japan on the Kurube River. The new station will be located at the foot of the Tsurigane Mountain.

A sum of £220,000 is to be spent by the South Manchurian Electricity Company on new generator plant for the Amanogawa power station.

The Kandy (Ceylon) Municipal Council proposes to spend £5,000 on additional electrical plant. In addition a new high-tension power cable is to be laid to Ampitiya and a sub-station erected there.

Plans are under consideration by the Australian Government for the unification of railway gauges between the mainland capital cities. It is anticipated that a total of £30,000,000 would be involved, of which £9,000,000 would be for alterations and replacements of rolling stock. The whole scheme would take some seven years to complete.

The Municipal authorities at Sydney (Australia) propose to spend £11,000 on new electrical sub-station plant at Waverley and Marrickville.

A number of new engineering projects are now under consideration in India and will probably result in some substantial contracts being placed with British firms during the year. An extensive road improvement programme, for example, is contemplated in the Noakhali district of India involving an expenditure of £100,000. The principal item of the programme is the widening of the 18-mile road leading to Bipulsshar, in the Tipperah district, and of the 41-mile road from Kakshmipar to Feni. The existing bridges on the two roads will be improved and all dangerous bends will be removed.

It is also proposed to construct a new 28-mile meter-gauge branch railway on the Bengal & North-Western system between Chakia and Sidhwalia. A spur line, 10 miles in length, will be constructed from Alwalia, on the new line, to Parsauni.

Estimates have been prepared for improvements to the Hyderabad State telephone system at an approximate cost of £40,000. New exchanges are to be installed at Nandad and Umri, and the trunk telephone system is to be improved by the erection of lines from Hyderabad to Bidar, from Raichur to Narayawpet, and thence to Saidapur, and from Warangal to Karimnagar. Further extensions to the trunk telephone system are contemplated.

Early this year the South Indian Railway Co. announced a programme of extensions in its east coast system, and it is now stated that, in addition to these lines, some 150 miles of meter-gauge railway lines are to be constructed on the central system. A new line will be laid from Palani through Drarapuram to Tiruppur, linking up there with the broad-gauge system. This new branch line will be extended northwards through Satyamangalam to Hardanhalli, the present railhead of the Mysore State Railways.

It has just been announced that a contract for the building of two new P. & O. Liners, has been secured by Vickers-Armstrongs, Limited, and will be carried out at Barrow. It comes at a time when the suspension of naval work and doubt as to future naval programmes were causing apprehension in the district. It is the largest order Vickers-Armstrongs have received for ten years, and will provide work for 2,500 hands in Barrow for at least two years.

When one takes into consideration all the details of construction, plates, turbo-electric machinery, auxiliary machinery, high pressure boilers, fittings, furnishings, etc., it practically means that there will be two years work for 5,000 hands in Barrow and other parts of the country.

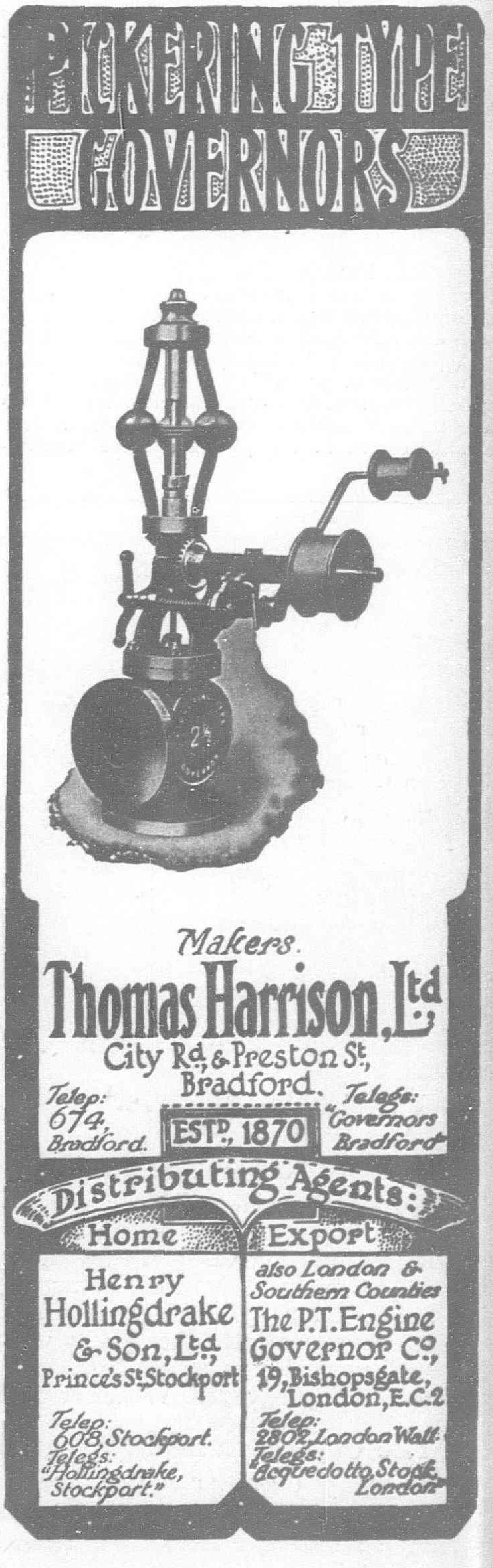
The total value of the contract is put at £3,000,000. There has been no official statement as to the size of these two vessels, but it is believed that they will be of about 20,000 tons each and have a speed of (approximately) 20 knots.

It is significant that they are to be driven by turbo-electric machinery, which will be constructed in collaboration with Vickers-Armstrong at the British Thomson-Houston Works at Rugby. Last year the Viceroy of India, the last P. & O. vessel constructed, had turbo-electric machinery installed. It was an interesting development, and the fact that the two new liners are to have similar instalments proves that the P. & O. Company, at any rate are satisfied with the results.

The boilers will be of the new Yarrow high-pressure type, with three stage-feed heaters. Those for the first vessel will be built by the Yarrow Company, and those for the second at Barrow. There was a rumor that one ship would be built at Vickers-Armstrong's yard on the Tyne, but this is now denied.

During the past few years Vickers-Armstrongs have built for the Orient Line several liners of 20,000 tons, the first being the *Orama*, and the last the *Orontes*. These fine ships have created a great impression in the Australian service, and it is possible that the two new P. & O. Liners ordered may be a bid by the latter company for the trade which has now been developed between this country and Australia. Regarding this, nothing has as yet been decided.

No time will be lost in preparing for the laying of the keels of the two ships. They will be the first P. & O. liners to be built at Barrow since the War. In his address at the recent annual meeting of the P. & O. Company, Lord Inchcape announced that the new vessels they were about to order would have large saloon passenger accommodation, every cabin having a porthole open to the sea. The ships, he added, would also have extremely comfortable third-class cabins, together with good cargo and refrigerated space. Their speed would be all that was required. The spacious boat deck would be available for sports, which the passengers greatly appreciate. The *Viceroy of India*, of 19,700 tons, has accommodation for 673 first and second saloon passengers.



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